Researching Environments for Early Learning (REEL) Study: Final Report

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1. Executive Summary

1.1 Background

The overwhelming majority of available evidence indicates early childhood education and care (ECEC) can bestow a wide range of benefits on attending children, their families and society. This includes, but is by no means limited to: better child well-being and learning outcomes, as a foundation for lifelong learning; more equitable child outcomes and reduction of poverty; increased intergenerational social mobility; higher levels of female labour market participation; and better social and economic development for society at large (Heckman, 2008; Melhuish et al., 2015; OECD, 2012; Siraj & Mayo, 2014).

However, the benefits of ECEC provision is largely dependent upon the ECEC being of good quality, with some benefits becoming apparent and others more pronounced when the quality of ECEC provision is high (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2004, 2011). As such, expanding access to ECEC without also attending to quality would not be expected to deliver substantially enhanced outcomes for children, or long-term productivity benefits for society. Yet, if a country can provide *high quality* ECEC for its children, studies show it can not only enhance children's lives in the here and now, but also advance the long-term outcomes for children. That is, it is simultaneously an investment in the present and the future.

There are a number of recognised methods that can promote quality in ECEC. Governments can promote quality through frameworks, standards and accreditation, technical support and establishing a rigorous inspection system. Researchers can promote quality via dissemination and translation of research in partnership with the sector. Post-secondary education providers can translate these insights, as well as knowledge of effective teaching, learning and teacher preparation, to ensure the quality of the incoming workforce. ECEC providers can focus on the training and status of existing staff, and encouraging and enabling self-evaluation.

One strategy that can be particularly efficient for improving quality is in-service professional development (PD). Up-skilling the current workforce is now a priority in many countries because of inconsistency in training and unequal quality of undergraduate and other qualifications (Ishimine, Tayler, & Bennett, 2010; Siraj & Kingston, 2015).

It is in this context that the Researcher Environments for Early Learning (REEL) study was conducted. This study sought to implement and evaluate an extended, evidence-based PD program aimed at improving key areas of process quality (i.e., interactional quality, curricular quality) that are important for children's developmental outcomes.

1.2 Study Design

Following consultation with members of Goodstart Early Learning's leadership, to ensure the articulation of the PD program with existing Goodstart frameworks and policies, the research team from Early Start, University of Wollongong, designed and refined the evidence-based *Leadership for Learning* PD program.

The *Leadership for Learning* PD was designed to cover the foundational principles of quality ECEC provisions in support of child learning and development, in areas of: self-regulation; language and communication; conceptual development in maths; and science and critical thinking. In contrast to the typical model of short-term or single-instance PD, *Leadership for*

Learning extended over the course of the year, comprising two full day sessions, 5 half-day sessions, and ongoing online resources, moderation and support. The PD featured a cascading model of delivery, positioning participants to take a leadership role within their centres that involved sharing their new knowledge with colleagues and families and supporting centre-level change.

To evaluate the effects of the PD, the REEL study adopted a cluster randomised controlled trial (RCT) design to generate the strongest possible evidence for efficacy of the PD. Initially, 70 Goodstart services in Victoria were recruited into the study, and highly trained observers conducted a one-day observation in each centre to assess curricular and interactional quality. Centres were then randomly allocated to either an intervention (to receive the PD in 2017) or control group (to continue practice as usual in 2017, and receive the PD in 2018), each with 35 services. The *Leadership for Learning* PD was then delivered to the intervention group over the course of the year, as follows: (1) two full-day intensive face-to-face sessions; (2) fortnightly half-day workshops; and (3) ongoing facilitated online learning throughout the remainder of the year.

Following the completion of the PD, all participating services in the intervention and control groups were again observed to complete a second assessment of environmental quality, again using the Early Childhood Environmental Rating Scale - Extension (ECERS-E, Sylva, Siraj-Blatchford & Taggart, 2010) and the Sustained Shared Thinking and Emotional Wellbeing (SSTEW) scales (Siraj, Kingston & Melhuish, 2015). Efficacy of the Leadership for Learning PD was evaluated by the change in quality over the year in the intervention group (those participating in the PD) compared to the control group (those who continued practice as usual).

1.3 Key Findings

A comparison of intervention centres against control centres demonstrated a number of direct benefits of participation in the PD program, as follows.

Initial analyses sought to evaluate the effects of the program under real-world conditions – that is, considering every centre in the study, even if they had low (or no) participation in the PD (as might be expected in large-scale rollouts). Despite this conservative approach toward estimating the benefits of the program, results indicated a significant effects of participating in the PD on both curricular and interactional quality. The benefit of the PD was distinctly apparent in areas of: (i) Literacy; (ii) Science; (iii) Diversity; (iv) Building Trust, Confidence and Independence; and (v) Supporting Learning and Critical Thinking. Further benefits in non-measured areas are also possible, and were indeed suggested by the qualitative results.

The benefits of the PD were even more pronounced if centres that did not have a reasonable level of participation in the PD were omitted. This estimates the effects when the program is implemented as intended. The increases in quality became more pronounced across all areas measured, and revealed an additional area of significant impact to the above (i.e., Assessing Learning and Language) amongst those centres with sufficient participation.

Qualitative analyses indicate that the educators also noticed these changes in children, and highlighted a number of additional benefits (and barriers) to their participation. Educators reported experiencing a positive shift in their personal pedagogy, with nearly two-thirds

noting increased confidence and motivation to implement changes and improve learning experiences for the children in their care.

The renewed senses (i) of purpose experienced by a number of the educators, and (ii) of understanding about the role high-quality ECEC plays in fostering better developmental outcomes among children were important outcomes of the PD.

Improvements in the quality of centres was matched by tangible changes in practice. Several educators mentioned increased focus on planning and documentation, an increased focus on supporting children's self-regulatory abilities and approaches to conflict resolution, and on greater attention to key curriculum areas including science, numeracy and literacy.

"Staffing" was both a facilitator and barrier to practice change. The two factors cited most as supporting implementations of learning from the PD were (i) another staff member from their centre attending the PD, and (ii) colleagues who were supportive and receptive to change. While about a third of participating centres were perceived to be 'receptive', more than half the respondents cited their colleagues' reluctance to embrace change as a significant barrier. Potential reasons for this include educator burnout, educators being overwhelmed by the number of changes that had occurred within the organisation, too many demands, a lack of value, low levels of staff qualifications, staff turnover and casualisation of staff.

Aspects that supported the PD were the use of structural supports such as the environmental rating scales (ERS) and the planning tools; links with the Goodstart Practice Guide; the increase in evidence-based practices where the PD provided clear links between practices and child outcomes; hands-on activities and practice examples; the fidelity and effectiveness linked to the capability, credibility and knowledge of the presenters; professionalisation of participants, opportunities for networking, and the structure that allowed for reflective practice during the PD (e.g., duration, time between half-day sessions).

Findings from the qualitative component of the study underscore the instrumental role of centre-based leadership in supporting practice change and fostering high quality pedagogy and practice. Several educators attested to the lack of support from centre management and to the lack of attention awarded to the PD; this resulted in the educators not being given time at staff meetings to discuss new practices and ideas, and no time off the floor for planning and reflection – a necessary condition for practice change.

1.4 Implications

Together, these findings provide strong motivation to make such PD routinely available for ECEC practitioners. It is noted, however, the benefits of staff quality improvement schemes such as this are dramatically reduced if there is instability of staffing (e.g., change in staff or centre leadership). Hence, stability of staffing should be addressed alongside PD and in conjunction with the use of rigorous, reliable quality and practice improvement scales such as the SSTEW and ECERS-E, which in this study appeared to support and empower educators.

The rest of this report provides a complete account of the REEL study, including rationale, study design, PD intervention, quality rating scales and detailed discussion of the findings.

2. The Researching Environments for Early Learning (REEL) study

2.1 Introduction

Attendance at high quality Early Childhood Education and Care (ECEC) settings has consistently been shown to have a robust and lasting positive impact on children's learning and development. While there is comprehensive evidence identifying key process and structural indicators of quality, there is much less evidence showing *how to enhance quality* in the ECEC field. In this context, Goodstart commissioned the Researching Environments for Early Learning (REEL) study, which involved the implementation and evaluation of a professional development programme in ECEC based on current best-evidence in international and national research. This report examines the details of this REEL study.

2.2 Background

There is a substantial international research base demonstrating the robust and lasting positive impact of high quality ECEC on various aspects of children's development. In fact, this is one of the most consistent findings in the scientific evidence about ECEC.

Key international large-scale longitudinal studies (such as the Effective Pre-school, Primary and Secondary Education (EPPSE) project that followed more than 3,000 children in the UK, the UK-based Families, Children and Child Care (FCCC) study of >1,200 children, and the US National Institute of Child Health and Human Development (NICHD) Study of Early Child Care, which included observations of >600 ECEC settings) show that both *attendance* at, and the *quality* of, ECEC matters. These studies found that children who had attended preschools had higher cognitive and socio-behavioural outcomes at primary school entry than those who had not (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2004). Follow-up studies found that these positive preschool effects were still apparent at the end of primary school (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2008; Melhuish et al., 2008) and that they also extended through secondary school years (Sylva et al., 2014).

The Australian Effective Early Educational Experiences (E4Kids) study (Tayler, 2016), which shows similar results and suggests that such interpretation of international studies is likely to predict similar trends in Australia. This study along with the Longitudinal Study of Australian Children (LSAC) and the Child Care Choices (CCC) Longitudinal Extension study (Bowes, Harrison, Sweller, Taylor, & Neilsen-Hewett, 2009) – which examined non-parental and familial care, and early school experiences of children in urban and rural New South Wales over a 7-year period – further emphasises the immediate and the long-term influence of ECEC on children's adjustment and school engagement.

Together, these studies show that aspects of children's childcare history, including the quality of care they received, in combination with family factors, predict children's achievement and adjustment in the year before school and in Kindergarten (first year at school). The quality of children's relationships with carers and teachers in their early 'school' experiences predict positive teacher-child relationships and more pro-social behaviour in kindergarten. These children are also more likely to say that they enjoy attending school (Bowes et al., 2009).

While the benefits of ECEC are notable for all children, they are most marked for children from poorer and disadvantaged backgrounds (Ruhm & Waldfogel, 2012). Typically, such children enter ECEC with lower scores on measures of socio-emotional and cognitive development than their more advantaged peers. There are a number of possible reasons for this, including the differences in learning opportunities and cultural capital available in the children's homes.

Children from more advantaged homes may have a greater variety and frequency of quality educational experiences (for example, trips to parks, libraries, museums and places of interest), and greater access to books, educational toys and more exposure to language with a richer and larger vocabulary. Plus, children from more advantaged home backgrounds may also experience more consistent parenting and less exposure to the effects of stressful life events, such as those due to financial pressures and/or cramped and unhealthy living conditions.Therefore the goal of improving the quality of ECEC is widely viewed as an essential element in achieving more positive and equitable child outcomes - especially for children from more vulnerable backgrounds (OECD, 2012).

The quality of ECEC is a multidimensional construct encompassing the physical environment, the educational curriculum, staff training and qualifications, child-staff ratios, group sizes, staff turnover and interpersonal relationships (Siraj et al., 2017). Three key dimensions of quality: 'structure', 'process' and 'outcome' have been used repeatedly and universally in the field of ECEC to assess the quality of provision (e.g., Holloway & Reichhart-Erickson, 1988; Phillipsen, Burchinal, & Cryer, 1997). 'Structure' refers to 'the resources used in the provision of care, to the more stable aspects of the environment in which the care is produced' (Munton, Mooney, & Rowland, 1995, p14). These include, for example, group size, the adult:child ratio, staff education and training, space and materials. 'Process' refers to 'the activities which constitute provision' (Munton, Mooney, & Rowland, 1995, p14). These include the less stable elements of provision such as staff/child interactions, approaches to pedagogy and practice, relationships, and approaches to leadership. 'Outcomes' relate to the cognitive, social and emotional development of the children in the centre, and include aspects of intellectual development such as oral and emergent reading skills, problem solving, the ability to pay attention and concentrate, and socio-emotional development - including children's relationships and their ability to self-regulate their behaviour and emotions.

Promoting better outcomes for children is complex, and requires attention to both process and structural quality. While structural elements of ECEC, such as staff qualifications and child-teacher ratios, contribute to quality of practice in ECEC, research shows increasingly that process aspects of adult-child and child-child interactions are the most influential aspects of ECEC, and are the most powerful predictors of children's subsequent outcomes (e.g., Sylva et al., 2004). Indeed it appears that structural factors exert their influence through their impact on process factors (Melhuish, 2004; Melhuish et al., 2015). The capacity of adults to engage deliberately with pedagogy and practice intended both to support relationships with children and to extend children's learning (relational and intentional pedagogies) is especially important for the quality of adult-child interactions.

When determining quality in ECEC, one of the most important structural measures is the educator's educational achievements and qualifications. There are clear links between the level and type of qualifications they possess, the professional development (PD) they have attended and its quality (Siraj & Kingston, 2015);

> *"There is a general consensus, supported by research, that well-educated, well-trained professionals are the key factor in providing high-quality ECEC with the most favourable cognitive and social outcomes for children. Research shows that the behaviour of those who work in ECEC matters, and that this is related to their education and training."(OECD, n.d.,* Encouraging Quality in Early Childhood Education and Care)

There is growing evidence that both the level of formally recognised qualifications gained, and the specific nature of the qualification, are important (National Research Council, 2001; OECD, 2012; Rhodes & Huston, 2012; Zaslow, Tout, Halle, Whittaker, & Lavelle, 2010). Studies report that both the levels of qualification which staff have achieved generally, and the relevance (content) of those qualifications to the sector, are associated closely with quality (Blau, 2000; de Kruif, McWilliam, Ridley, & Wakely, 2000; Honig & Hirallal, 1998; Howes et al., 1992; Phillipsen et al., 1997; Sylva et al., 2004).

Both the content and structure of qualifications and of PD appear to make a practical difference in the setting. Research shows, for example, that a good working knowledge of child development and early childhood pedagogy is a common characteristic of effective educators (Neilsen-Hewett, Siraj, Grimmond, & Fitzgerald, 2018; Siraj et al., 2018; Siraj-Blatchford, Sammons, Sylva, Melhuish, & Taggart, 2006); and that educators with specific training and qualifications in the field hold less authoritarian beliefs about child-rearing and provide higher quality provision rated as safe, clean and stimulating (Blau, 2000; Philips et al., 2000, cited in Tout et al., 2015, Howes et al., 1992). The complexity of the research findings suggests that staff with both formal qualifications and ongoing PD are likely to have the greatest impact on pedagogy and practice in the setting/classroom - with PD's focus on classroom practice complementing the theoretical learning gained from an academic qualification.

There is little doubt that staffing is a fundamental factor in the quality of the setting, and higher quality staff have a positive impact on the quality of a setting (Campbell-Barr, 2009). Improving the quality of ECEC and learning outcomes for children requires a highly skilled workforce - one which offers reflective practice, sound decision making and personalised care (Cooke & Lawton, 2008). It is also important to recognise that the quality of ECEC is only affected minimally by the physical environment (i.e., buildings), and that the most important pre-requisite for quality provision is the quality of the educators who work with the children and families (Abbott & Rodger, 1994). According to Fukkink and Lont (2007), there is ample evidence that providing qualifications and PD for educators (developing capacity) improves children's learning and wellbeing. They say:

> "*The training of caregivers is a cornerstone for quality in early care. Caregivers with high educational levels provide better personal care...are more sensitive...are more involved with children...and have more knowledge of developmentally appropriate practice...Furthermore, more educated early educators offer richer learning experiences...provide more language stimulation...and stimulate the social and physical skills of children more often than other educators."* (p 294).

Given this evidence, it is imperative that intervention efforts focus on equipping early childhood educators with the capacity to create high-quality environments and experiences that are conducive to children's learning and development. There is, however, relatively little evidence regarding enhancing quality within the ECEC sector. It is complicated by the

variation found between educators in terms of qualification (i.e., CERT-3, Diploma, Bachelor and Masters degrees), and their different roles, understandings and experiences.

The REEL PD responded to this inherent diversity by advocating team-based approaches and collaboration, and by accommodating different styles and processes for learning. Professional development programmes that support change and improvement usually include some key features (Dunst, Trivette, & Hamby, 2010), which Kingston (2017) has grouped into three domains: (i) *content*: evidence-based practice including links between theory and practice, assessment and planning; (ii) *process*: intensity, duration and attendance, plus the critical mass of staff and the involvement of managers/leaders; and (iii) *affect*: developing professional relationships and supporting personal characteristics. A complete overview of the PD content is provided in the Methods.

2.3 Conceptual Framework

Several models have proposed how PD can work to influence educators and the outcomes of children. Desimone (2011) proposes a basic model, subsequently elaborated, which suggests that successful PD includes these sequential steps:

1. Educators experience the PD.
2. PD increases educators' knowledge and skills and/or changes their attitudes and beliefs.
3. Educators use their knowledge, skills, attitudes and beliefs to improve the content of their instruction and/or their approach to pedagogy.
4. Instructional changes introduced by the educators boost the children's learning.

Dunst (2015) developed this model and applied it to an ECEC context. He advocated that PD should be evidence-based, that the changes may be at the family and the child level, and that attitudes and beliefs towards the new approaches within the PD change following practice improvements and changes. He suggested five linked, sequential, steps: (i) evidence-based in-service PD practices; lead to (ii) changes in early childhood educator knowledge and skills; which lead to (iii) educators' adoption and use of evidence-based intervention practices; which lead to (iv) changes and improvements in child and family outcomes; which result in (v) changes in educators' attitudes and beliefs.

The *Leadership for Learning* PD programme was founded upon this evidence base, and demonstrates the importance of process quality (e.g., curricular and interactional quality) and highlights the aspects of professional learning that are most likely to yield positive changes in professional practice. As a consequence of these changes in practice, it was expected that the quality of the ECEC provision (as objectively measured using ERS) and, by extension, subsequent child outcomes, would also improve.

The effectiveness of the *Leadership for Learning* PD in improving the quality of curricula and interactions across ECEC services was first seen in the Fostering Effective Early Learning (FEEL) study (Siraj et al., 2018), which involved 90 ECEC settings across NSW (i.e. preschools, long-day care services) each with an Early Childhood Teacher (ECT) working with children in their year before school entry. The PD programme's impact was assessed using both direct outcomes at the preschool room and indirect outcomes at the child level, potentiated by the increased quality of environments and experiences received by the children in the ECEC centres.

Direct outcomes were captured in the FEEL study by objective, environmental observation measures of ECEC quality: (i) the Early Childhood Environment Rating Scale-Extension (ECERS-E, Sylva, Siraj-Blatchford & Taggart, 2010), which focuses on curriculum content, concept development and pedagogy; and (ii) the Sustained, Shared Thinking and Emotional Well-being (SSTEW) scale (Siraj, Kingston & Melhuish, 2015), which focuses on interactional quality and social/emotional skills via relational and intentional pedagogy.

Child-level outcomes comprised two measures each of: language (i.e., verbal comprehension, expressive vocabulary); numeracy (i.e., early numeracy, early number concepts); and social-behavioural development (i.e., the Strengths and Difficulties Questionnaire (SDQ), Children's Self-Regulation & Behaviour Questionnaire (CSBQ)). A comparison of intervention centres with control centres demonstrated both direct and indirect benefits of participation in the PD programme: significant improvements in the quality of curricula (e.g., literacy, mathematics, science, diversity) and interactions (e.g., sustained shared thinking, supporting children's social-emotional well-being); improved cognitive outcomes for children in language and numeracy development; and improved socio-emotional development, with a reduction in reported internalising behaviours (an indicator for emotional and peer problems).

The REEL study built on this earlier research and customised the *Leadership for Learning* PD (Siraj et al., 2018) to the Goodstart educational context. The PD was strengthened in accordance with recommendations made from the FEEL study (see Siraj et al., 2018), with a stronger focus on planning and assessment and improved approaches to diversity and differentiation. The PD also drew upon patterns of strengths and weaknesses in practice that had been identified in the baseline curricular and interactional quality measures within the study, and made links throughout to the Goodstart Practice Guide and the Early Years Learning Framework (EYLF), to ensure that the PD met the needs of all participating educators. Further, the PD was responsive to the needs of the educators, with the final phase incorporating their suggestions and identified areas for further development. Furthermore, findings from the in-depth FEEL case studies (Neilsen-Hewett et al., 2018) provided a comprehensive model of excellent practice for the Australian ECEC context highlighting key factors that supported *sustained* growth and room-level practice change.

While the training focused on effective practice for all children and drew from these findings, it was responsive to the structural and pedagogoical platforms which are unique to Goodstart.

2.4 Overview of the REEL Study

The REEL study's main objective was to evaluate whether the bespoke *Leadership for Learning* PD programme, compared to routine practice, could enhance ECEC curricular and interactional quality. The PD's goal was to improve the knowledge, skills and attitudes of the educators who took part in the intervention, with the ultimate aim of improving the experiences and outcomes of the children attending the educators' centres.

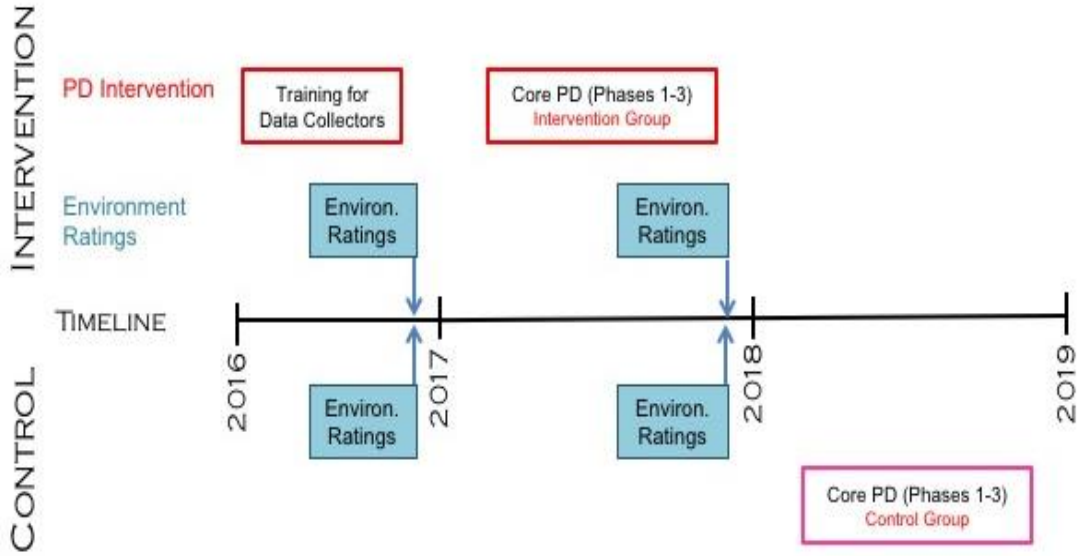
The settings involved in the REEL study were 70 long-day care services in Goodstart's Victoria network, with a focus on rooms containing children in the year before school entry. Half the centres (the intervention group) were selected randomly to participate in the *Leadership for Learning* PD Programme in 2017. To evaluate the effects of the PD on interactional and curricular quality, environmental quality ratings were conducted at the end of 2016 (prior to commencement of the PD) and at the end of 2017 (after the end of the PD

programme). The study used a cluster randomised controlled trial (RCT) design, which is the strongest method for drawing conclusions about the causal effects of a PD intervention.

Additional precautions, such as the data collection team not knowing (i.e., being blinded) which centres were in the intervention and control groups, and the efforts to ensure broad diversity between centres, minimised the possible influence of confounding factors in drawing conclusions from the study findings. Figure 1 provides a visual timeline of the study design.

Alongside this cluster RCT design, a qualitative evaluation was also conducted on: educators' experiences and perceptions; the PD's influence on participants as professionals and *Leaders for Learning Champions*; and perceived improvements to quality for the staff, children and families with whom they work. The centres in the control group (and, therefore, not participating in the PD in 2017) received the PD in the subsequent year, after the PD evaluation had been completed.

Figure 1. *The design of the REEL cluster randomised controlled trial (RCT) examining the efficacy of the Leadership for Learning Professional Development (Core PD).*



2.5 The Leadership for Learning Professional Development (LFLPD) Programme

The content knowledge discussed during the LFLPD programme reflects current research, and includes child development and key domains of learning - such as communication, language and self-regulation, knowledge of emergent numeracy, science and exploration. In addition, it covers approaches to assessment and planning, observational links to learning intentions, instructional techniques and clear progressions in learning over time.

LFLPD focused on supporting high quality interactions through explicit intentional teaching: supporting and enhancing children's outcomes through planning and teacher guidance, and instructional activities which are sequential and built upon existing skills. Each LFLPD session included examples of practice through specially selected high quality DVD clips, discussions about the underlying theoretical models and concepts, and teaching about recent research. This rich mix enabled critical reflection and supported future improvements. All

sessions made links to appropriate frameworks, including the National Quality Standards (NQS) and the Early Years Learning Framework (EYLF), and were tailored to the Goodstart context and existing resources (e.g., Goodstart Practice Guide).

Appendix A provides an overview of expected outcomes for: educators participating in the training; colleagues and other staff in the participating centres; and children enrolled in the intervention centres. A more detailed overview of the content included in each of the three LFLPD phases is presented below.

2.5.1 Overview of Phase 1.

Phase 1 consisted of two days intensive training in a face-to-face setting. The sessions began with an overview of research about quality in ECEC contexts, drawing on key national and international studies. The sessions introduced participants to the environment rating scales, and key concepts and ideas designed to support the educators in identifying areas of practice that they would target for improvement (see Table 1).

Table 1.
Overview of REEL Phase 1 Content

Session Content	Participant handouts at this session:
• Introduction to the REEL study. • Why is quality ECEC important?: Evidence from research • Leading quality and driving improvement through intentional and relational pedagogy. • What is language and how does it develop? • Introducing the family of Environment Rating Scales with a focus on ECERS-E. • How the SSTEW scale supports quality improvement. • Discussion and reflection and planning for change.	1. A copy of the SSTEW and ECERS-E. 2. An agenda for the training days. 3. Printout of all PowerPoint slides. 4. Laminated printout of *Leadership for Learning: Expected Outcomes.* 5. Example and blank copies of the Improvement Cycle: Reflect and Assess, Plan, Implement and Evaluate (RAPIE). 6. An item from the ECERS-E on improving vocabulary development. 7. A workbook to support understandings of adult and children's interactional styles, language acquisition and development, and the role of the adult when engaging in sustained shared thinking. 8. Phase 1 evaluation questionnaire.

2.5.2 Overview of Phase 2.

Phase 2 consisted of five bi-weekly half-day sessions in a face-to-face setting. Effective PD not only combines curriculum and child development knowledge with practice, but also allows time for educators to use newly learnt knowledge, understanding, approaches, etc., within their settings - and to analyse critically and reflect upon impact (Hamre, Downer, Jamil, & Pianta, 2012).

These sessions allowed participants to try, test and evaluate different aspects of practice and new knowledge during and between sessions. Educators were encouraged to make individual adaptations to their pedagogy and practice, appropriate to their children and context. Such

changes reflected different needs and starting points, and supported ownership and the sustainability of any changes made. The sessions supported critical reflection of participants' own and others' practice, and supported improvement and planning for changes in practice through the Improvement Cycle: Reflect and Assess, Plan, Implement and Evaluate (RAPIE). Each session included adequate time for reflection and critical analysis, and introduced knowledge and pedagogical content about areas not covered in Phase 1 (see Table 2).

Table 2.
Overview of REEL Phase 2 Content

Session Content	Participant handouts at each session:
Session 1: Self-regulation • Exploring the different aspects of self-regulation. • Understanding the influence of self-regulatory abilities for development. • Examining the role of the educator in teaching self-regulatory skills. • Examining specific activities that can be used in individual and group settings. • Reflecting on their own practice and identify areas for further focus.	1. Promoting self-regulation – Powerpoint slides. 2. The Improvement Cycle (RAPIE) – 'Example' handout. 3. The Improvement Cycle (RAPIE) – 'Blank' handout. 4. Developmental Psychology and Early Childhood Education (Whitebread, 2011) – assessment of self-regulation and implications for planning. 5. Good practice in an Early Years Setting (Kingston, unpublished). 6. Nine ways to extend a topic, add to, and/or enrich children's understanding, thinking and language.
Session 2: Language and Literacy • The importance of literacy. • Importance of language. • Research on language and literacy development. • Incorporating literacy in everyday experiences. • Creating resources for promoting language and literacy. • Involving parents and other caregivers.	1. Literacy – Powerpoint slides. 2. The Improvement Cycle (RAPIE) – 'Blank' handout. 3. Ideas and Games for Language and Literacy 4. Laying the Foundations of Literacy – Self-evaluation tool 5. Kid sense: Stages of Language Development 6. Best Beginings: Dialogic Reading 7. Dialogical Reading Observation Form 8. Book Selection for Dialogic Reading

Session 3: Science and Critical Thinking • Define emergent science. • Discuss the scientific process and scientific content for the early years. • Understand the link between science and other areas of development. • Increase confidence in supporting children's scientific endeavours and knowledge. • Practical ideas for supporting science in ECEC contexts.	1. Science and critical thinking – Powerpoint slides. 2. The Improvement Cycle (RAPIE) – 'Example' handout. 3. Science Materials within the ECEC context – Handout. 4. SSTEW scale scenario. Subscale 4: Supporting learning and critical thinking. Item 11. Encouraging sustained shared thinking in investigation and exploration. 5. Science Books for Preschool resource list (The National Center on Quality Teaching and Learning).
Session 4: Numeracy • Define numeracy. • Importance of numeracy. • Maths anxiety. • Different aspects of numeracy. • Incorporating numeracy in everyday activities. • Numeracy within the centre. • Numeracy self-assessment. • Planning for numeracy.	1. Numeracy - Powerpoint slides. 2. Math Anxiety Self-assessment-Questionnaire. 3. Key mathematical concepts and principles (Table 6.1; Pendergast & Garvis, 2013). 4. For our final week - the improvement cycle homework sheet.
Session 5: Leadership for Learning and Assessment • Reflect on leadership role within centre/preschool. • Explore the different aspects of leadership and consider what constitutes effective leadership. • Revisit key messages discussed throughout Phase 1 and 2 of the Professional Development. • Examine their role as Leaders for Learning Champions (LLCs) in supporting staff, ensuring sustainability and supporting children's learning.	1. Effective Leadership – Powerpoint slides. 2. Sustained Shared Thinking – Handout. 3. Assessment and Planning – Handout. 4. Diagnostic Map: Measurement – First Steps in Mathematics. 5. VCAA Early Years Exchange – Template. 6. Kid Sense: Stages of Language Development. 7. Prep Monitoring map – Numeracy (Queensland Government). 8. Adult Initiated Plan – Example and Template. 9. Early Mathematical Patterning Assessment (EMPA) and "An Early Mathematical Patterning Assessment: identifying young Australian Indigenous children's patterning skills" (Papic, 2015). 10. SSTEW Activity for Item 13 page 36. 11. REEL Professional Development model. 12. Phase 2 Evaluation – Questionnaire.

2.5.3 Overview of Phase 3.

Many PD programmes are challenged by their limited reach, with only those attending the sessions able to benefit from the content. Their long-term impact may be limited if practices do not filter through to all members of staff within a centre. This can be circumvented by supporting and improving quality education and care, and by PD which embeds whole-centre change, in combination with models of sustainability.

The sustainability phase of the LFLPD programme built on Phase 1 and 2, and continued throughout the project. Phase 3 encouraged continued PD through online modules and staff induction for any new staff/teachers to the setting. The online supported learning platform was made available to the participants throughout the PD, and was designed to support the face-to-face sessions in Phases 1 and 2. Then, in Phase 3, it became a platform for communication, collaboration and further learning.

Online resources and activities were embedded within the online UOW Moodle platform, and designed to promote staff engagement and establish an online community of educators. The LFLPD content were housed within modules or 'E-books' that combine video streamed content integrated with questions and text, including links to activities and an educator discussion forum. The E-books were designed to guide educators through an interactive learning experience which encouraged and required both self-reflection and connection with other educators across the Goodstart network.

3. Methods

3.1 Study Design

The REEL study adopted a clustered RCT design to yield the strongest possible evidence about the extent to which the *Leadership for Learning* PD programme could affect positive changes in ECEC curricular and interactional quality. Seventy Goodstart long-day care centres in Victoria were recruited for this study. These were selected to ensure representation across both National Quality Standards (NQS) ratings (working towards, meeting, exceeding) and socioeconomic areas based on the Australian Bureau of Statistics' (ABS) Socio-Economic Indexes for Australia (SEIFA). The final sample of centres and randomisation approach/success is given below.

3.2 Centre Characteristics and Recruitment

To select centres, an initial anonymised list of all Goodstart centres in Victoria (N = 172) was received. Criteria for the blind selection of centres were: (1) being < 200 km from Melbourne's central business district (to constrain travel costs); and (2) not participating currently in other research (other than the Practice Guide Evaluation study, for which 12 centres were included intentionally to leverage planned data collection). This yielded 148 eligible centres. After accounting for the characteristics of the twelve Practice Guide evaluation centres, a further stratified random selection of 58 centres was made to ensure that the selection's distributions of NQS ratings and socioeconomic areas was representative of Goodstart's entire network in Victoria. After selection was complete, these centres were re-identified by Goodstart. Remaining centres were placed on a backup list to supplement recruitment if any initial approach was unsuccessful. This process ensured that centre selection was random, and could not be influenced by Goodstart or the research team – and so ensuring that the study's results can be generalised.

Following this process, 70 Goodstart centres were recruited to the study. These included: a small proportion of regional centres (n = 15; 21%); a majority of metropolitan centres (n = 55; 79%); a full range of NQS ratings – 'Working Toward' (13; 19%), 'Meeting' (44; 63%), 'Exceeding' (13; 19%); and a mean SEIFA decile of 5.36 - with 19% drawn from areas of disadvantage (as indicated by SEIFA deciles 1-3).

3.3 Cluster Randomisation

After both centre recruitment and initial baseline environment ratings, each of the 70 centres was assigned randomly to either the control or the intervention group. Nobody involved in the process knew in advance which centres would be assigned to which group. The success of this randomisation was evaluated by comparing the two groups, and this indicated that the groups were highly comparable across the full range of centre characteristics considered (Table 3).

Table 3.
Centre Characteristics, by Group

	Intervention	Control
Number of centres	35	35
ECERS-E Rating	*M* = 2.95 (*SD* = 0.91)	*M* = 3.08 (*SD* = 0.83)
SSTEW Rating	*M* = 3.77 (*SD* = 1.19)	*M* = 3.88 (*SD* = 1.11)
Geographic Location	7 regional, 28 metro	8 regional, 27 metro
NQS Rating	6 WT, 23 M, 6 EX	7 WT, 21 M, 7 EX
Maximum Places	*M* = 85.41	*M* = 87.71
SEIFA Decile	*M* = 5.43 (14% Deciles 1-3)	*M* = 5.29 (23% Deciles 1-3)

Subsequent analyses sought to evaluate comparability of key quality areas across the groups, and this indicated that baseline quality ratings were highly consistent across groups for all scales and subscales (Figure 2). See next section for further details of the Environmental Rating Scales used.

Figure 2a. Baseline Environmental Ratings by Subscale, Separated by Group (ECERS-E)

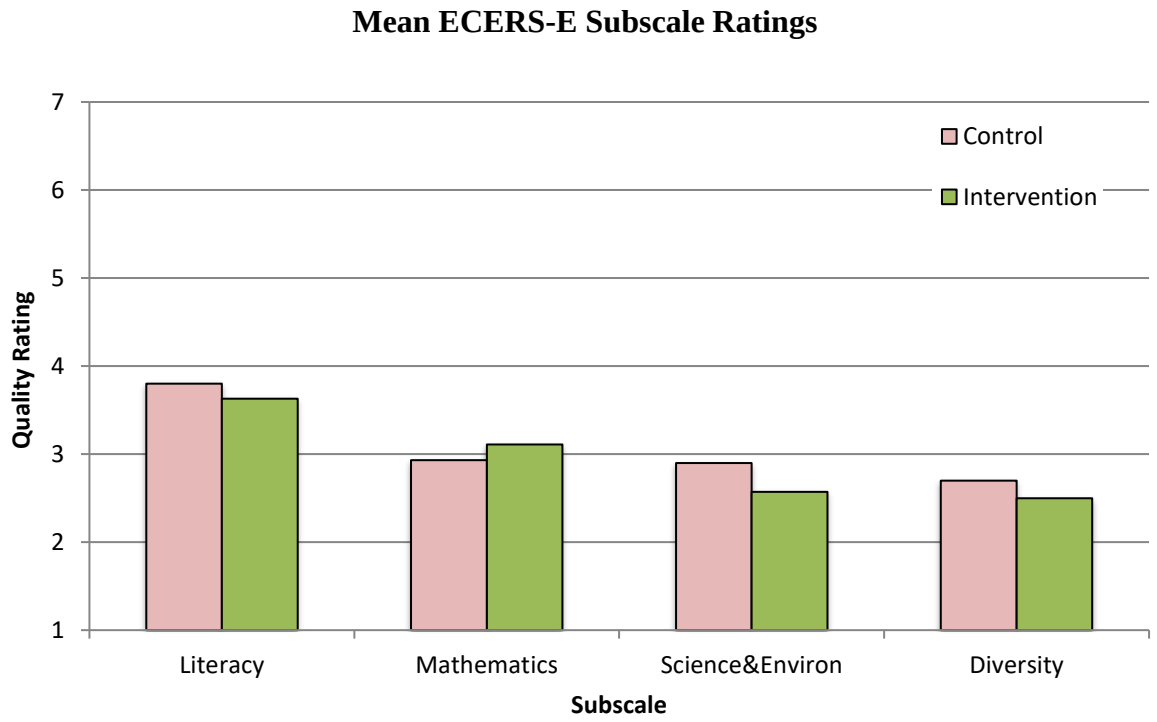
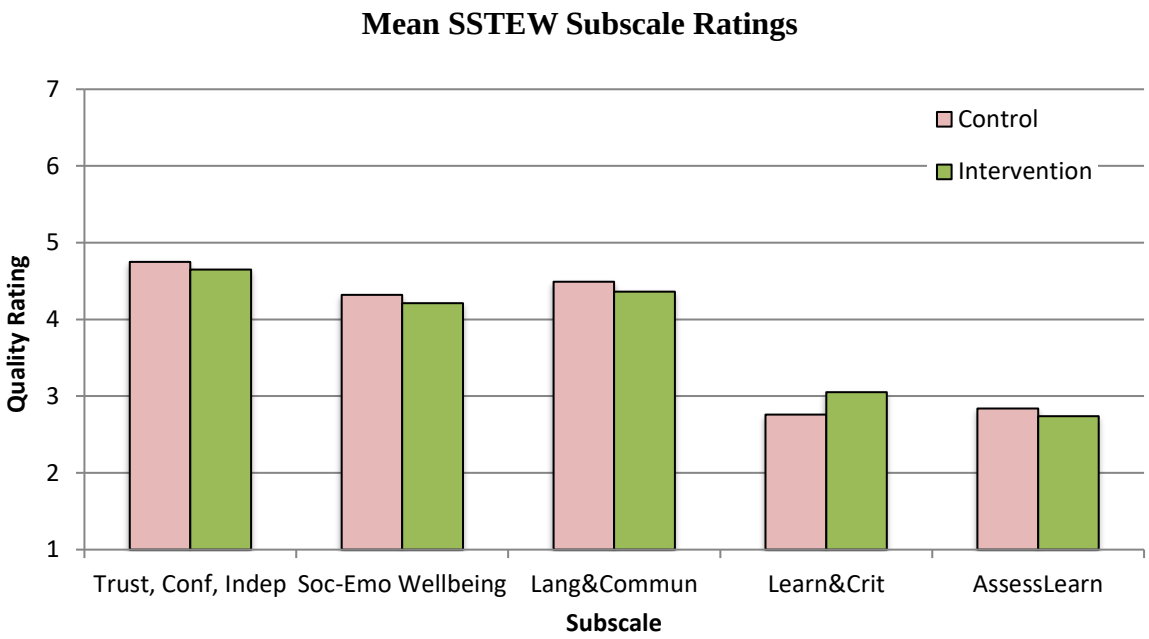


Figure 2b. Baseline Environmental Ratings by Subscale, Separated by Group (SSTEW)



3.4 Intervention Evaluation: Quantitative Measures

The REEL study looked carefully for any changes in curricular and interactional quality. Two Curriculum, Leadership and Interaction Quality Rating Scales (CLIQRS) were used to identify and evaluate any changes that had occurred. The scales used were the Early Childhood Environment Rating Scale – Extended (ECERS-E; Sylva et al., 2010) and the Sustained Shared Thinking and Emotional Well-being (SSTEW; Siraj et al., 2015) scale.

The Early Childhood Environment Rating Scale – Extended (ECERS-E) measures the quality of the curricula, environment and pedagogy in ECEC settings. ECERS-E comprises 15 items across four subscales: literacy; mathematics; science and environment; and diversity. Using on-balance judgements derived from a one-day room observation, each item is rated from 1 (inadequate practice) to 7 (excellent practice) based on patterns of the presence or absence of the item's constituent indicators. ECERS-E has been shown to have good reliability and predictive validity of child development progress at school entry (Sylva et al., 2006). The items for each subscale are averaged to create subscale scores, and the subscales are then averaged to generate an overall scale score.

The Sustained Shared Thinking and Emotional Well-Being scale (SSTEW, Siraj, Kingston & Melhuish, 2015) brings together different dimensions of the ECEC environment to consider practice that supports children aged 2 to 5 in developing skills in sustained shared thinking and emotional wellbeing. This scale contains 14 items across five subscales: building trust, confidence and independence; social and emotional wellbeing; supporting and extending language and communication; supporting learning and critical thinking; and assessing learning and language. Like ECERS-E, each item is rated from 1 (inadequate practice) to 7 (excellent practice) based on the pattern of presence/absence of the item's indicators. Items are averaged to produce subscale scores, and the subscales are then averaged to generate an overall scale score. SSTEW has also been shown to have good reliability and predictive validity of child development (Howard, Siraj, Melhuish, Kingston, Neilsen-Hewett, de Rosnay, Duursma, & Luu, forthcoming).

Both scales were completed during the same observation day. In all cases, these ratings were undertaken by highly trained observers (reliable to a trained, experienced and reliable 'gold standard' observer) through a one-day observation of each pre-school room in participating centres. In all cases, those involved in conducting the quality ratings were blinded to each centre's group allocation. To ensure reliable observation ratings, observer training involved five days of intensive training, including in-field practice ratings with gold standard raters, followed by rigorous inter-rater reliability checks. All observers were required to meet the following standard of inter-rater reliability against a gold standard rater prior to entry into the field: (1) an intra-class correlation exceeding .70 (M = .86); (2) a correlation exceeding .70 (M = .86); (3) a mean difference in ratings less than 0.75 (M = 0.43); and (4) an agreement of ratings (within 1 point) of at least 80% (M = 93%).

3.5 Intervention Evaluation: Qualitative Measures

Following completion of each phase (one, two and three) of LFLPD, participants were asked to complete three short evaluative questionnaires. Responses from Phase 1 were used to inform and shape delivery of Phases 2 and 3. At the end of Phases 2 and 3, participants completed a questionnaire that asked them to evaluate their overall experience of the PD programme (examples of questions are detailed in Appendix B). The questionnaire used at the end of Phase 2 asked participants to consider the key messages they had received from the PD, which aspects of the PD they found to be most helpful and challenging, how the PD had influenced them as practitioners, any changes they may have implemented or witnessed as a result of the PD (to their own practice, colleagues, children and families), aspects that may have facilitated or impeded their ability to implement changes, their thoughts on the actual delivery of the PD, and their ideas on how they could be supported better in the next phase of PD.

The questionnaire used at the end of Phase 3 consisted of both Likert-scale and open-ended questions. Likert-scale questions asked participants to rate (i) the degree of change they had experienced as a result of the PD in different domains (e.g., their level of motivation, confidence and collaboration with colleagues), and (ii) how useful they had found specific topics within each phase. The open-ended questions in Phase 3 were similar to those used in Phase 2, but also asked participants to describe the greatest impact the PD had had on their practice, how they had cascaded their learning from the PD to other colleagues in their centre, and the process by which changes in practice had occurred in their centre. Simple demographic information was also collected at the end of the questionnaire, including position, qualification, years of teaching experience and hours worked per week at centre.

Participants completed the questionnaire for Phase 1 and Phase 2 at the PD venue. For Phase 3, participants were given the option to complete the questionnaire in their own time and location - either in hard copy or online (via Survey Monkey). Each questionnaire took circa 30-45 minutes.

3.6 Intervention Evaluation: Analytic Plan

The extent to which participation in the *Leadership for Learning* PD was associated with a positive change in curricular and/or interactional quality was evaluated using a combination of quantitative and qualitative analyses.

3.6.1 Quantitative evaluation of PD effects

The effects of the intervention on environmental quality ratings were analysed using regressions across the full sample (i.e., intention-to-treat), whilst controlling for essential variables which might account for observed differences (i.e., geography, NQS rating, area-level socio-economic status (SES), baseline environment ratings). In order to consider the effect of the PD among those who maintained a minimum threshold of participation (to more accurately examine its effect with adherence), the analyses were repeated for a per-protocol sample. A series of planned follow-up analyses sought to explore further the impact of initial quality on both intervention effects and variability in intervention effects.

3.6.2 Qualitative analyses of educator experience and perceptions of the PD

To understand further the potential reasons for variability in intervention effects across centres, a qualitative analysis of educators' perspectives and experiences of the PD was carried out. These analyses sought to identify educator-reported changes within their centres (e.g., personal or among colleagues, children, and families), and to recognise any particular structural, process or content factors which may have facilitated or impeded change.

Table 4.
Summary of Key Overarching Themes and Example Questions

Key Theme	Question example
Leader for Learning Champion: Personal journey (reflective practice, shifts in pedagogy, philosophy)	• What were the 'key messages' you received from the professional development (PD)? • What challenged you the most as a Leader for Learning Champion during the PD (i.e. content, philosophy, practice, and approach to pedagogy? • How has the PD influenced you as practitioner? Consider, for example, your learning, motivation, planning, knowledge?
Perceived practice change and perceived impact	• Describe change(s) you have made to your practice since participating in the PD. Please provide examples. • Describe the impact the changes you have made to practice for: the children, other staff and families.
Supports and challenges for implementation of centre change	• What factors supported implementation of the PD learnings throughout your centre/preschool (e.g. receptiveness of staff, having access to the online Moodle)? • What barriers have you experienced to implementing the PD in your centre/preschool?
Evaluation of the PD in terms of content, process of delivery, and affect	• Which aspects of the PD have you found most helpful and why (please provide an illustrative example)? • Are there any improvements to the PD sessions you would recommend?

Analyses of participants' responses to the questionnaires was approached in three stages. In the first stage, the researchers familiarised themselves with the data and began to generate initial ideas for a coding scheme. Using a deductive approach based on existing literature (Kingston, 2017), individual questions from each questionnaire were grouped under key overarching themes which captured effectively the range of participants' responses (Table 4). Illustrative quotes for each theme were also identified.

In the second stage, the data was imported into NVivo (version 11), and participant responses were coded for common concepts - using the initial overarching themes as a guide. Qualitative analysis software was used to 'model' preliminary ideas. An inductive process was used to generate a coding structure, with categories derived from empirical data. The coding process in NVivo was thorough, comprehensive and inclusive, with all participant responses coded. An iterative process of coding and refining nodes involved adding new nodes, taking some away, and combining them where relevant. For example, initial coding nodes such as *motivation*, *confidence*, and *knowledge* were identified - and then collapsed under the overarching theme of *personal journey.*

Reliability and validity of the data were ensured through a cross-checking process using a subset of illustrative quotes to ensure that each quote had been coded appropriately. A hierarchical framework was formed of the overarching themes which had been identified initially. The participant responses were re-examined carefully to ensure that the agreed codes were applied across all data. It is important to note that, although NVivo software was used to organise data thematically, the process of analysis involved switching focus between the nodes of the theoretical framework and the complete responses to maintain the depth of participants' perspectives.

4. Results: Environmental Quality

4.1 Brief Overview of Environmental Quality Findings

Intervention evaluation analyses indicated that centre participation in the PD had a significant impact on quality for both ECERS-E and SSTEW and their subscales. On average, the intervention centres showed quality improvements across both scales and subscales, while the control group showed quality declines (see Table 5 and Figure 3).

When considering only those centres that maintained a minimum threshold of participation in the PD (86%; see *per-protocol* analyses), the positive effects of the intervention were enhanced even further (see Figure 4). Furthermore, the positive effects of the PD remained over and above any effects of geographic category, NQS rating, SEIFA decile or baseline ERS quality rating. This suggests that these effects were robust (see Appendix B, Table B.1).

Table 5.
Average ECERS-E and SSTEW scale and subscale scores at baseline and follow-up

	Intervention group			**Control Group**		
	Baseline M (SD)	Follow-Up M (SD)	Chg	Baseline M (SD)	Follow-Up M (SD)	Chg
ECERS-E	**2.95 (0.91)**	**3.36 (0.90)**	**+.41**	**3.08 (0.83)**	**2.80 (0.83)**	**-.28**
Literacy	3.63 (0.82)	3.94 (1.08)	+.31	3.80 (0.86)	3.34 (0.97)	-.46
Mathematics	3.11 (1.47)	3.20 (1.25)	+.09	2.93 (1.26)	2.74 (1.24)	-.19
Science	2.57 (1.10)	3.41 (1.09)	+.84	2.90 (1.11)	2.69 (0.98)	-.21
Diversity	2.50 (0.86)	2.90 (1.01)	+.40	2.70 (0.80)	2.44 (0.93)	-.26
SSTEW	**3.77 (1.19)**	**3.93 (1.28)**	**+.16**	**3.88 (1.11)**	**3.32 (1.22)**	**-.56**
Building TCI	4.62 (1.29)	4.90 (1.31)	+.28	4.82 (1.34)	4.30 (1.38)	-.52
SE Wellbg	4.20 (1.75)	4.14 (1.78)	-.06	4.40 (1.42)	3.49 (1.70)	-.91
Lang-Comm	4.31 (1.36)	4.36 (1.32)	+.05	4.51 (1.23)	3.91 (1.25)	-.60
Learn-Crit	3.01 (1.28)	3.25 (1.39)	+.24	2.81 (1.24)	2.41 (1.14)	-.40
Assessing	2.71 (1.19)	3.01 (1.34)	+.30	2.86 (1.20)	2.50 (1.43)	-.36

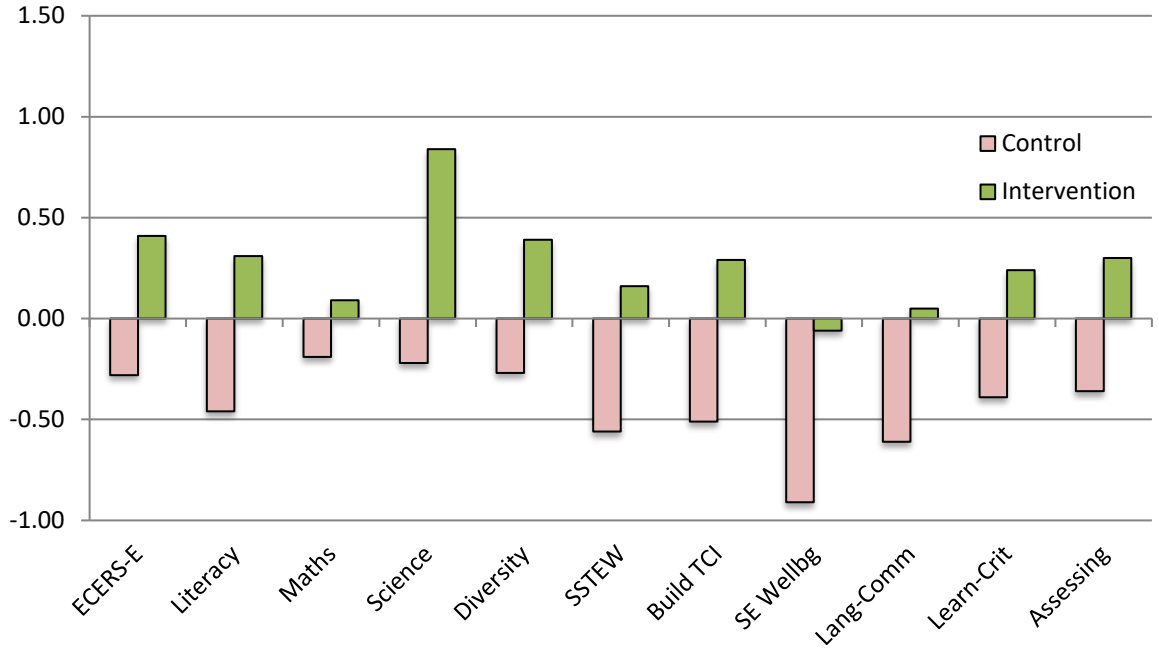
Note. ECERS-E and SSTEW are measured on a 7-point scale, such that 1 = inadequate quality ECEC, 3 = minimum quality ECEC, 5 = good quality ECEC, 7 = excellent quality ECEC. Build TCI = Building Trust, Confidence and Independence. SE Wellbg = Social-Emotional Wellbeing. Lang-Comm = Supporting and Extending Language and Communication. Learn-Crit = Supporting Learning and Critical Thinking. Assessing = Assessing Learning and Language.

4.2 Full Sample (Intention-to-Treat) Evaluation

The efficacy of the intervention in affecting positive change in ECEC quality was evaluated using regression analyses on the full sample - adjusting for geography, NQS rating, area-level SES and baseline environment ratings. Even though a minority of intervention centres did not maintain a high level of PD participation across the entirety of the project, these full sample analyses are important to maintain the demographic balance generated by initial randomisation. Intention-to-treat analyses avoid possible over-optimistic estimates of intervention efficacy which can result when ignoring non-participants (Gupta, 2011). Instead, a full sample approach accepts that non- and low-participation, and other protocol deviations, are a likely outcome in real-world implementation and thus seeks to determine the intervention's impact under real-world conditions.

Results of intention-to-treat regression analyses, examining the effect of group on quality of ECEC post-intervention, indicated a significant effect of the PD intervention for both scales and for most subscales (Table 3 and Figure 3). Specifically, significant intervention effects were found with: Literacy; Science; Diversity; Building Trust, Confidence and Independence; and Supporting Learning and Critical Thinking. These effects remained even after controlling for geographic category, NQS rating, SEIFA decile, and pre-intervention CLIQRS quality rating (see Appendix B).

Figure 3. *Comparison of scale and subscale scores for intervention and control group.*



Note. ECERS-E indicates average change score (post-intervention minus baseline) across all ECERS-E subscales. SSTEW indicates average change score across SSTEW subscales. Build TCI = Building Trust, Confidence and Independence. SE Wellbg = Social-Emotional Wellbeing. Lang-Comm = Supporting and Extending Language and Communication. Learn-Crit = Supporting Learning and Critical Thinking. Assessing = Assessing Learning and Language.

4.3 Participating Sample (Per-Protocol) Evaluation

While intention-to-treat analyses provide a conservative estimate of an intervention's effect (Gupta, 2011), subsequent intervention analyses usually consider those which meet a sufficient threshold of participation and adherence to intervention protocols (a per-protocol evaluation). Per-protocol adherence was referenced against the study's requirement for at least two staff members from each centre to attend the face-to-face PD (participation in Phase 3 was more difficult to index because the number of users and quality of use was impossible to discern from numbers, lengths and pages visited during login).

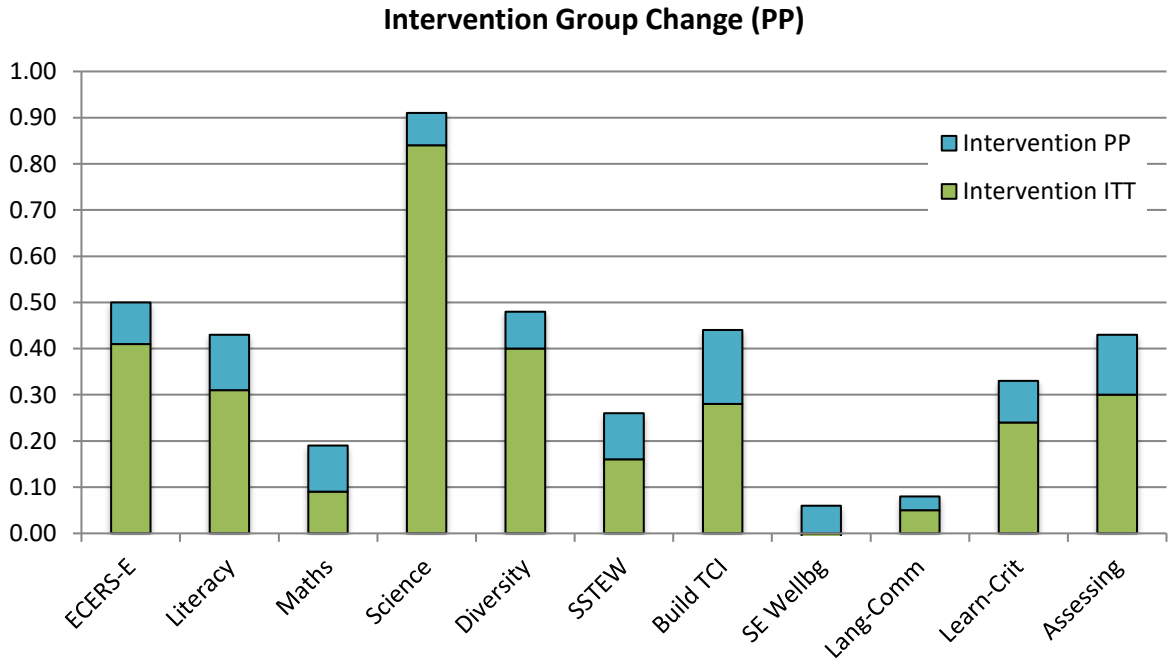
To create an index of a centre's attendance, two core principles were considered: that (1) no face-to-face session was more important than any another (thus, sessions were divided into half-days to provide a uniform metric, giving a total of nine half days); and (2) there is additional benefit from a second (and third, etc.) educator attending the PD, although the degree of benefit is likely diminishing with each additional educator in attendance. As such, attendance was considered using the following formula: [(# of half days attended by Educator

1) + ([# of half days attended by Educator 2 * 0.50) + ([# of half days attended by Educator 3 * 0.33)]. This generated a maximum score of 16.50 (three educators attending all Phase 1 and Phase 2 sessions).

The mean attendance score for all intervention centres was 12.30 (*SD* = 3.58, range = 0.00-16.50). Two centres (6%) did not attend any PD sessions due to withdrawal from the study prior to commencement of the PD. Most other centres sent at least two educators to the Phase 1 PD sessions, except for two centres (6%) which sent one educator for one Phase 1 day. For Phase 2, 28 centres (80%) sent at least one educator to all half-day sessions, while 15 centres (43%) sent at least two educators to all half-day sessions. Given this pattern of attendance, the minimum threshold to be included in per-protocol analyses was decided as two educators attending the first two full days and at least half the half-days (10.50 points). This threshold removed five intervention centres from per-protocol analyses.

Results of the per-protocol regression analyses again indicated a significant, marginally larger effect, of the PD for the same scales and subscales, plus one further subscale (Assessing Learning and Language; Figure 3). These effects remained even after controlling for identified covariates. The size of the intervention's effect on pre-school room quality, indicated by standardised regression weights, improved in all cases. Further, the degree of change in environment ratings improved for the intervention group.

Figure 4. *Comparison of scale and subscale scores for per-protocol intervention centres.*



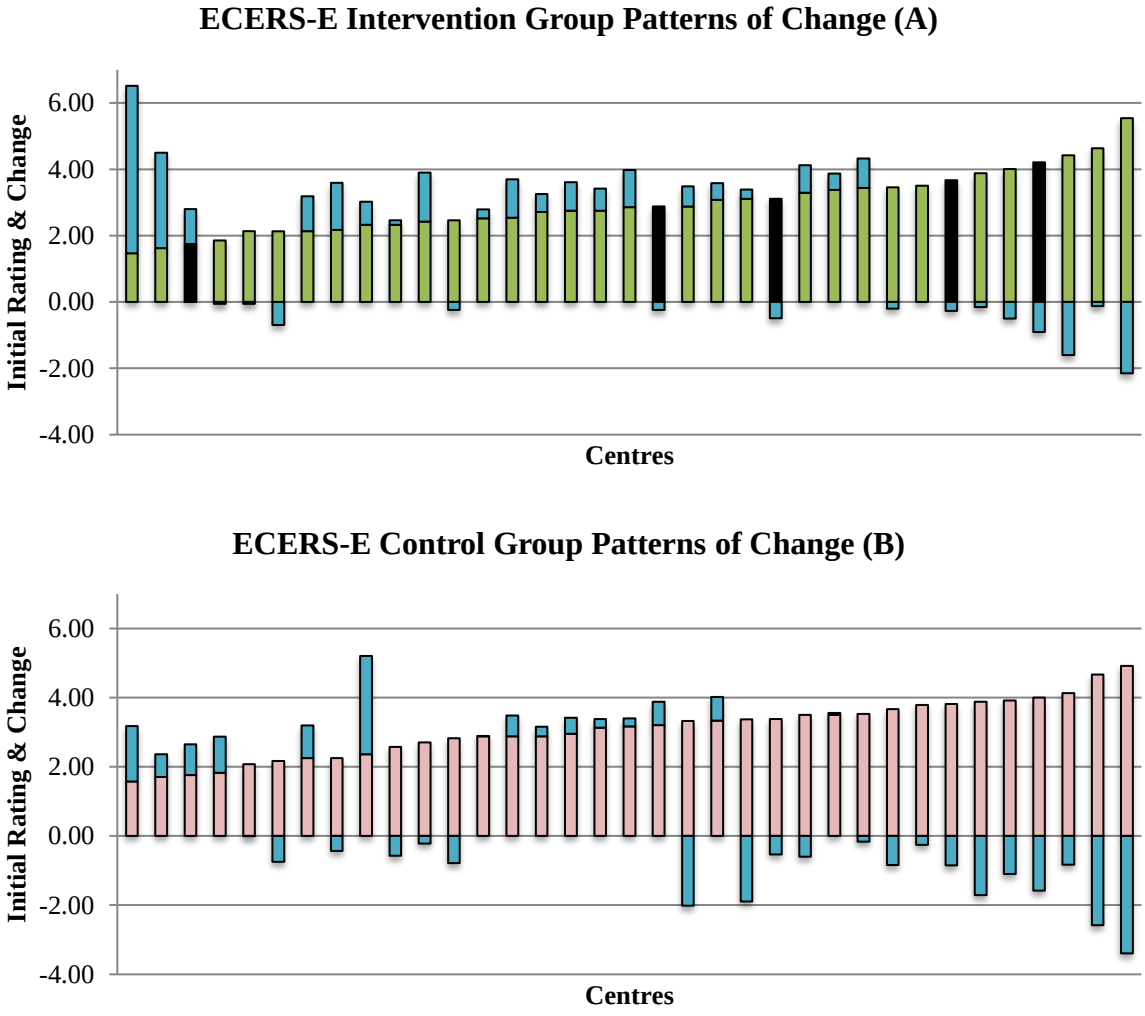
Note. Blue area of bars shows the increased average change in quality when considering per-protocol centres compared to all intention-to-treat intervention centres (the average change for which is indicated by the blue area of the bars). ECERS-E indicates average change score (baseline to post-intervention) across all ECERS-E subscales. SSTEW indicates average change score across SSTEW subscales.

5. Results: Qualitative Analyses

5.1 Variability in Quality Change Across Intervention and Control Groups

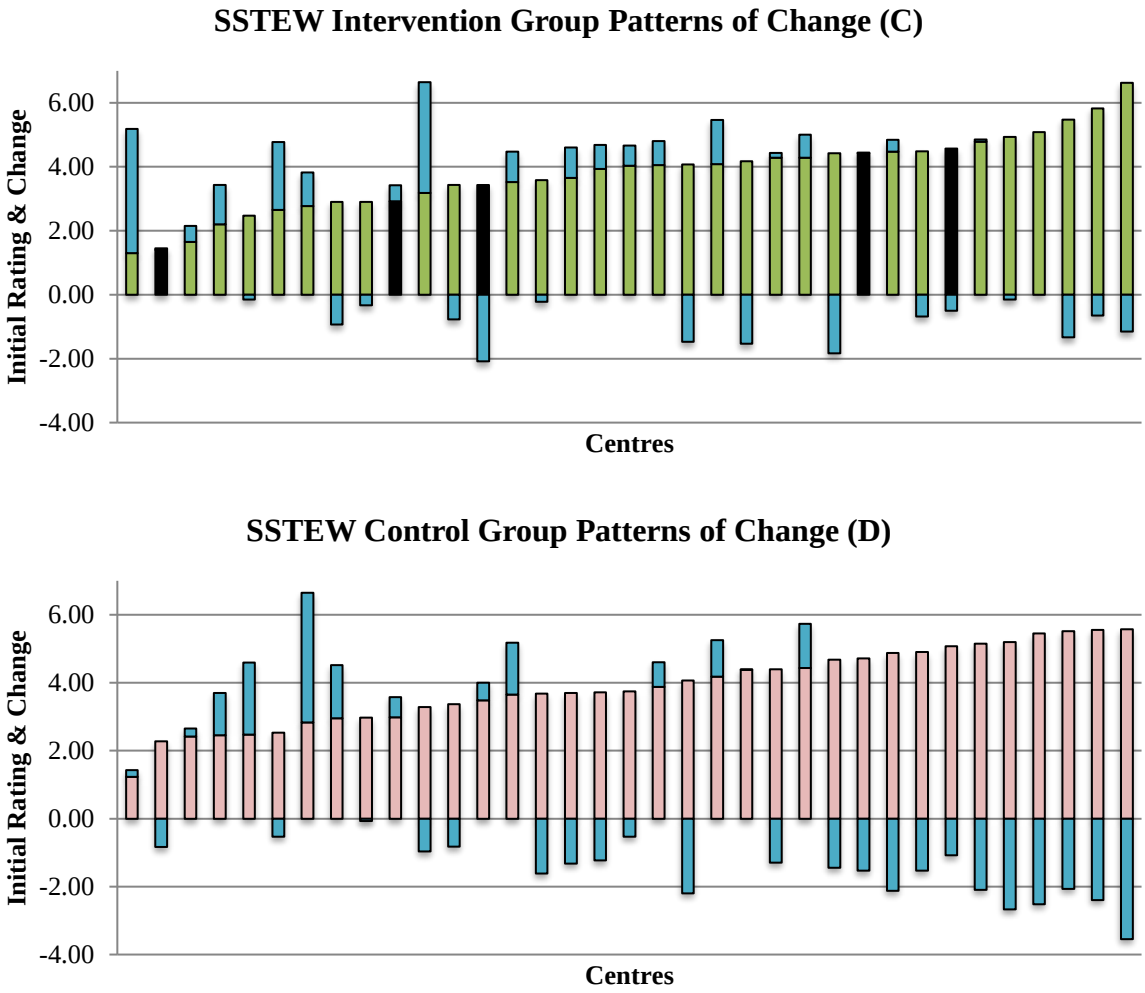
The previous analyses illustrated, quantitatively, that there was a direct overall influence of the Leadership for Learning PD on educator practice and behaviour. As, however, is often the case, the extent of change varied across the sample, but these findings reveal little about the variability in change across the sample (Figures 5a and 5b). As such, a qualitative evaluation was undertaken to understand the likely facilitators and barriers of effective implementation of the PD.

Figure 5a. *Pattern of quality change for each sample room in ECERS-E for Intervention (A) and Control (B)*



Note. Green/pink bars indicate baseline quality scores and blue bars indicate change in quality after the PD intervention. Where the blue bar appears below the green/pink bar, this indicates the level of decrease in room quality since baseline rating. Black bars indicate centres eliminated from per-protocol analyses.

Figure 5b. *Pattern of quality change for each sample room in SSTEW for Intervention (C) and Control (D).*



Note. Green/pink bars indicate baseline quality scores and blue bars indicate change in quality after the PD intervention. Where the blue bar appears below the green/pink bar, this indicates the level of decrease in room quality since baseline rating. Black bars indicate centres eliminated from per-protocol analyses.

5.2 Shifts in Personal Pedagogy, Philosophy and Reflective Practice

Following completion of each phase (Phase 1 – a two day intensive face-to-face workshop; Phase 2 – five fortnightly half-day face-to-face workshops; Phase 3 – ongoing facilitated online support and learning; see Section 1.4 and Appendix C) participants were asked to complete a short evaluative questionnaire. Responses from Phase 1 were used to inform and shape the delivery of Phases 2 and 3. Face-to-face PD sessions (Phases 1 and 2) were evaluated at the end of the last session in each phase. A final online evaluative survey was sent to participants in November 2017. Of the 72 participants, 71 completed the evaluation (99%) at Phase 1, 62 completed the evaluation at Phase 2 (86%), and 32 completed the evaluation at Phase 3 (44%). The following elements of the questionnaires are reported below: how educators perceived (i) the PD to have influenced them as professionals and *Leaders for Learning Champions*; (ii) the main changes/improvements to quality for staff, children and families; and (iii) the aspects of the PD which had supported or challenged practice change.

In the Phase 3 evaluation, educators were asked to provide ratings of any changes in their beliefs, pedagogies and practices subsequent to the PD. They were asked to rate their agreement on 5-point Likert scales (1 = not at all to 5= very much) for 21 statements. These included: I feel more motivated/the PD has renewed my enthusiasm for teaching; my understanding of how children learn and develop has improved/deepened; I am more open to change. Educators' ratings of the same statements allowed for comparisons and averages to be considered. From the 32 respondents, the range of mean responses (3.47 – 4.16) demonstrated the participants' overwhelmingly positive responses to the statements and PD.

When the mean scores on the statements were separated according to the four highest and four lowest means, some tentative conclusions could be drawn. The highest scoring statements (very much agreed) appeared to be for some of the simpler and more readily achievable aspects of change: for example, they felt that the PD confirmed what they knew and believed about children's learning; that they were more reflective and more knowledgeable about effective practice, and that they were more successful in supporting children's learning. The lowest mean scores (which, objectively, were themselves relatively high) clustered around some of the more complex aspects of change, including those which implied a change in the culture of the setting, including increased job satisfaction and collaboration with colleagues within and outside their own settings. These clustered differences link to current thinking regarding change and PD – and to challenges around developing collaborative teams which may take time to achieve (Rodd, 2006). Time is also needed for new understandings, practices and approaches to become embedded.

Participants were asked to reflect on how the PD had influenced them as a practitioner, and the following results reflect patterns of responses across Phase 2 and Phase 3 evaluations. Changes noted by educators reflected personal, philosophical and attitudinal shifts, improved pedagogy and practice, enhanced knowledge and understanding of the educational and social-emotional needs of the children in their care, and a deeper understanding of their role as an educator in the lives of children (see Appendix D, Table D.1 for an overview of key themes and illustrative quotations).

Most educators surveyed (95%) reported a shift in their pedagogical approach through the PD. Educators stated that the PD had influenced them as practitioners by increasing their confidence and motivation to implement changes and to improve learning experiences with children (61%), while increasing their overall knowledge and understanding of quality pedagogy and practice (41%). Most notably, they stated that the PD had renewed their sense of purpose as an educator. They acknowledged the relationship between high quality in the early years and better developmental outcomes for children. They also highlighted that the PD had inspired them to improve and to be more goal-oriented in their practice (17%) and had increased their knowledge and understanding of high quality practice (29%).

> *"It has given me confidence. I've always been a holistic thinker and this PD has given me a framework that allows me to deliver an integrated programme. I've also grown a lot through reflection against the information delivered in this PD. For example, using "OWLing", I've caught myself in moments of interacting with children where I know I could have done that better. The PD has also given me a tool to strive for excellence. I'm pushing myself towards specific goals as presented in the scales." (ECT)*

Changes to planning (25%) were also noted, and the participants reported that they were keen to share this information with their colleagues (23%),

> "*I have recently been reflecting on how my planning can reflect what the PD has offered me. I am currently in the process of exploring different ways of making the learning visible and meaningful for other educators, children and families*"(ECT).

Discussing their changes to pedagogy, they referenced an increased awareness of pedagogical approaches with increased intentionality (33%),

> *"I've changed my thinking. I'm looking through a more specific lens that relates to research and best practice now. My interactions have improved - lots more open questions, lots more extending. My environment has changed to support a holistic approach and integrated curriculum. My pedagogy has changed - lots of reflection and determination to strive higher, to be a better teacher"* (ECT)

Educators had changed their practice by recognising the environment as important for children's learning and making associated changes (26%); they implemented more science learning experiences in their room (28%), and were mindful of their use of language with children (26%). More focus was given to teaching children numeracy (24%), literacy (21%), and engaging in more dialogic reading (21%). Further, the changes in practice were also shared with colleagues who did not attend the PD (19%). Educators noted that the PD had provided them with a wealth of ideas for their practice (15%) and had helped to reaffirm or refresh the knowledge that they already had (15%).

> *"It has enhanced my learning as I have begun to actually notice how much science and maths is involved in most of the experiences for the children which has further motivated me to use the correct terms and enhance the children's knowledge. I have been making a deliberate decision to actually add it to my planning (planned or spontaneous). It has motivated me as a group leader to enact, to motivate other co-educators to embrace the change"* (ECT)

Educators emphasised that they had become more aware of the way that experiences could be turned into teaching opportunities for children (18%) and acknowledged that different domains areas, such as literacy, science, and numeracy, could be integrated within the one experience (16%),

> *"That all areas – i.e., literacy, science, numeracy are happening all around us – we need to be aware of this and capture those teachable moments. Being intentional and using these opportunities to extend on each child's knowledge, skills and attitudes. Children's self-regulation and resilience have major impact on lifelong learning, stability and success"* (ECT)

Finally, educators found that they were extending children's learning (14%), and engaging in reflective practice (16%), more often. The PD encouraged the participants to be more reflective in their practices and to reflect deeper to find ways of supporting better the needs of children, and extending children's thinking. Another positive aspect of the PD included inclusion of the RAPIE (Reflect and Assess, Plan, Implement and Evaluate) Improvement Cycle to guide educators' practices, evaluation and reflection, *"RAPIE is a great reflection on what I plan to do and how I implement it"* (ECT).

5.3 Impact on Other Staff

The *Leadership for Learning* PD was structured around a cascading model of delivery in which participating educators were asked to share the information and practices they had examined through the face-to-face PD sessions with their centre or preschool colleagues. Improvements in overall classroom quality, rather than merely changes in attendees' practices, were enhanced by including more than one educator from each participating centre – as was the promotion of a leadership model, which underscored the active role of participants in driving practice change, as well as the provision of access to the online platform of learning, which housed all the content and resources of the face-to-face sessions.

Throughout both Phase 1 and 2, educators were encouraged to see themselves as *Leaders for Learning Champions*, as playing an integral role in the development of their non-attending colleagues. A measure of success for the PD, therefore, was to see changes among other educators in the classroom - rather than simply among the educators who attended the PD. Analysis of responses showed that the main approaches to sharing information with colleagues were through conversations among educators in the room (n = 18), presentations at staff meetings (n = 14), formalised PD using the online Moodle supports (n = 10), modelling of practices (n = 8), sharing hand-outs (n =2), introducing staff to the environmental rating scales (n = 12).

> *"The staff have been really receptive after asking what we have learnt and what knowledge can be shared. We have included a number of concepts during our staff meetings which occur once a month. It has been great being able to model examples of experiences and reflect and involve other staff members."* (ECT)

While educators identified changes among themselves more easily than among their peers, there were still some shifts in staff pedagogy and practice - as detailed in Appendix D (Table D.2). One dominant theme was the importance of distributing and sharing information with colleagues. The most frequently cited challenge by participants was the difficulty they perceived taking the information from the PD and relaying to their colleagues (55%). Getting their fellow educators "on board" presented a challenge for many of the participants - with only one in five participants stating that their colleagues were responsive to the changes they tried to implement (21%).

Notable changes to practice among those staff willing to change included improved pedagogy and practice (19%) which encompassed such things as better awareness of approaches to communicating with children, becoming more critical about the type of interactions they were involved in, and being more reflective in their practice (12%),

> *"Like myself, my colleagues have taken on board the resilience and self-regulation and realised our practices from birth have an impact on a child developing resilience and self-regulation. Becoming more involved in researching and also in critically reflecting on their practices. They are taking a more holistic approach in their pedagogy."* (ECT)

Improvements in the quality of interactions with children were also observed (17%), as was evidence of improved knowledge, intentionality and understanding (14%), *"Some staff are asking questions and clarifications on the resources given. They have become more aware of the learning present in the experiences and areas that they set up*" (ECT). As a whole,

changes seen among colleagues were limited, with implementation of knowledge from the PD seen as a gradual process (12%).

5.4 Impact on Children

The Leadership for Learning PD model not only addresses the need for whole-room or centre change, but also draws on practices and processes that are evidence-based as important in fostering developmental outcomes for children (Siraj-Blatchford, Sylva, Muttock, Gilden, & Bell et al., 2002; Sylva et al., 2004). Sixty-one of the 72 educators surveyed noticed changes among the children in their care through the PD.

These changes were framed by educators in two ways. First, they described changes for children in terms of educators' modified practices and children's resultant experiences (37%). They felt that the children benefitted from improvements in the quality of adult-child interactions (25%) and improved approaches to pedagogy (15%). For example, there were mentions of children being engaged in more meaningful learning experiences, encountering more question-asking, and engaging in SST.

> *"I believe that because of a change in our practices through our better understanding that our children have developed many skills that they will take with them on their journey through life, that of curiosity, having a go, risk taking and patience as they build their resilience and self-regulation."* (ECT)

And, second, they described changes for children in terms of how they responded. For example, they were more engaged in their learning:

> *"The children are more engaged in the experiences we have offered to them. They ask more questions that reveals more mathematical and science concepts. I think the children now participate more in their relationships with peers."* (ECT)

The impact of the PD on children, as perceived by their educators, was seen largely in terms of: (1) changes to children's engagement and motivation, and (2) increased learning and problem solving. The educators commented on the children being more engaged (53%), more active problem solvers (20%), more regulated in their behaviour (17%), and more capable of expressing themselves (12%).

> *"The children are able to express their interests and have input into our learning programme. The children are exposed to more high quality learning activities as well as engage in better conversations with their teacher."* (ECT)

> *"Children are more engaged in a wider variety of experiences. They are showing more curiosity about different experiences and finding things in the yard and bring attention to it."* (Educational Leader)

Children also seemed to be exposed to, and show more interest in, numeracy (15%), science activities (15%) and demonstrated a wider vocabulary (12%). Although some educators thought it was too early to notice changes, others observed change within a few weeks. Many commented that children took charge of their own learning and were more capable of engaging in learning than the educators had anticipated. Several noted that *"taking a step back and observing children"* had made a large impact. One of the PD's strengths was that it

allowed educators to see the direct link between providing quality experiences and the children's behaviour and outcomes. Appendix D (Table D.3) summarises the most frequent themes which emerged when educators described changes for children.

5.5 Changes for Families

From an ecological perspective, genuine change occurs only when there is consensus and connection across the multiple contexts in which children operate (Bronfenbrenner, 1979). A focus of the PD was to ensure improvements in both understanding of child development and enhanced pedagogy and practice - with the goal that these would extend beyond the ECEC setting to encompass the Home Learning Environment (HLE).

Almost half the educators surveyed (48%) commented on the PD resulting in enhanced connections and increased involvement with families,"*Families are enjoying seeing the experiences (individual and group) that we are doing and are communicating more which is improving my relationships with the families." (Assistant)*

Changes included increased communication, supporting parents in their interactions with their children, parents noticing changes in their children, and an indication that families showed greater understanding of their children's learning, particularly with respect to recognising the role of educators in their child's development (i.e. beyond baby-sitting), and the importance of high quality early childhood practice. 33% reported receiving positive feedback from parents about changes that they had made as a result of the PD, and 12% noted that they had received comments from parents about a deeper understanding of their children's learning (12%). These items are elaborated in Appendix D (Table D.4).

> *"Families have been giving us great feedback. Saying the children have been replicating what they're doing at kinder at home. With one mum saying her daughter who never spoke, now never stops talking."* (Room Leader)

> *"Families are able to see (visible learning) what their children are learning through Storypark. Parents are opening up on their needs and concerns for their children, makes it easier for us to identify individual learning needs"*. (ECT)

20% of the educators surveyed mentioned little or no changes for families as a result of the PD. Their reasons included not having yet received feedback from families, uncertainty about how information could be filtered through to families, lack of awareness or interest of families, and variability in educators' work days so they could not speak with families.

> *"I don't feel this has happened as yet but the plan will be to get staff involved with discussing with families how their children engaged and what they learnt, share the same terminology with them as we do when planning. This will impact their understanding of how much learning we promote and encouragement we provide their children and benefits*." (Room Leader)

The greater numbers of educators reporting fewer changes for families (compared to changes to own practice, for other educators, and for children) is unsurprising given that the PD focused on what occurs inside the room. While educators were branded as leaders who would share information with other educators throughout the PD, the focus remained largely on their

colleagues and the children in their rooms. Even so, one educator noted that she had not seen many changes with families because her team already had a strong bond with them.

5.6 Structural, Process and Content Impact

Participants were asked to reflect on (a) what they saw as the 'key messages' addressed throughout the PD, (b) how the different elements of the PD supported them in making changes to pedagogy and practice within their centre, and (c) any structural or process qualities which facilitated this practice change. Appendix D (Tables D.5 to D.6) provides an overview of the main themes that emerged from the content analysis of educator responses across all three phases.

The key messages received from the PD were largely in relation to the key subject areas presented: the value of teaching literacy (44%), numeracy (39%), science (37%) and, more importantly, the fact that the different domains of literacy, science, and numeracy are interrelated and can be woven together in one learning experience (26%). Other key messages included the understanding that there are numerous chances to engage in pedagogy (31%), and that interactions with children (29%) experiences (19%), sustained shared thinking (18%) and environments (16%) are important for children's learning. Educators noted that improvement could be set as a goal (27%), where changes to a programme can be made without the need for expensive resources. Self-regulation was identified by a fifth of participants as essential for children's development (19%). In addition, educators noted that it was important for information about the PD to be shared with colleagues so that they could improve their own practices (19%).

Some educators noted the value of attending the PD, the importance of high quality practice in the early years, and its impact on later development for children (21%),

> *"I feel the effect of the study will increase quality. I believe that providing the research with the 'why' and the 'where' the information and the statistics and data has come from helps the educators take on board the information and want to implement the practices/concepts etc. If every educator attended these sessions the quality of education in the sector would increase."* (Centre Director)

Nearly half (43%) mentioned that the scales (ECERS-E and SSTEW) would be very useful for identifying practices that they could aim to improve upon. The scales were also perceived as helpful for engaging in reflective practice (21%) and self-assessment (10%), were easy to follow (16%), and were a good resource to share with colleagues (12%). Five educators noted that the scales would support the EYLF and NQS guidelines because they were more detailed (7%).

Participants were very positive about the PD's process of delivery. They appreciated the fact that it was a continuous PD rather than a single day, and that more than one educator from their centre was able to attend. When asked to comment on what aspects of the PD they found most helpful, educators focussed predominantly on curriculum content and information obtained on science (33%), numeracy (28%), literacy (23%) and the connection between these domains (15%). Suggestions about distributing and sharing ideas from the PD with colleagues who did not attend was also perceived as helpful (23%). The wealth of content and ideas, and the ease in which they could be understood, was also seen as a facilitator of

practice change (20%), *"I was very impressed with the way the PD sessions were run. I loved the fact that they balanced theoretical with practical knowledge"* (ECT).

Participants valued the inclusion of illustrative practice examples (i.e. resources, games, practice videos and hands on activities) (20%) and noted that the PD was useful in providing a new framework for pedagogy (18%),

> *"I liked having the research (the proof) as to why and how these practices assist children with their learning journey. Practical tasks got us thinking and planning higher quality programmes for our children. Opportunity to reflect and plan further learning opportunities for both staff and children supported practice change."* (Room Leader)

Finally, educators stated that the ability to network with other centres at the PD (16%) and the research evidence provided during the PD (15%) were also particularly helpful aspects of the PD.

The fidelity and effectiveness of the PD was linked to the capability, credibility, accessibility and knowledge of the presenters. 70% of participants commented on the approachability, passion and professionalism of the facilitators, and felt that this was a key element in the success of the PD. The participants emphasised the way that the presenters were so in touch with early childhood education *"You understand the challenges we may face when implementing this in our centre. When delivering you deliver in a relatable and applied way (not clinical)"* (Educational Leader) and their increased value as 'professionals',

> *"It has extended me and I feel more valued as a teacher and the importance of the role that I play in children's lives on an ongoing basis. I am more motivated to go the extra mile. It has been wonderful extending on my existing knowledge and refreshing what I have not read about for a while. The course has been hugely beneficial*."(ECT)

The two most cited factors as supporting the implementation of learning from the PD were (i) another staff member from their centre attending the PD (41%), and (ii) colleagues who were supportive and receptive to change (36%),

> *"The staff in my room were very open to change and have been happy to implement changes and grow as individuals. Other staff participating in the PD have improved in their practice and we are talking more about children's learning and being accountable to one another"* (Room Leader).

In addition, having a supportive manager was also helpful in supporting changes as a result of the PD (17%). Other factors included: opportunities to present information from the PD at staff meetings (17%); use of the online Moodle to review and share information (10%); and conversations and exchanging ideas between educators (10%). Ten participants (17%), however, mentioned little or no supportive factors and noted that there had been ongoing difficulties in their ability to implement any changes within their workplace.

Effective PD also depends on a deep understanding of the aspects that challenge participants. Two themes emerged frequently when educators were asked about barriers they had encountered in attempting to implement the information that they acquired from the PD.

First, over half (55%) identified their colleagues' reluctance to embrace change,

> *"Some educators have been fantastic and on board others are just not willing to change their practice in anyway. As I am one of the youngest educators at the centre some of the mature age educators do not like me wanting to make changes"* (Assistant).

Many talked about push back from staff, staff not wanting more work to do,*"Engaging educators that are not in the kinder room has been the biggest challenge. They don't like to take on new things (workload) even if we believe it will reduce the workload."* (Senior Educator)

and a feeling that staff in the centre felt they were already doing a good job,*"Not everyone is on board, they don't like change. Some educators think they are already doing things and don't want to improve"* (ECT).

And, second, exactly half reported that it had been challenging to find time to share the information from the PD with colleagues and to plan for implementing changes.

> *"The most challenging has been the lack of support from the centre. For example, no time has been allocated throughout the days to implement change or even at staff meetings to discuss the PD. I'm struggling to provide interactions that are based on Sustained Shared thinking when I'm in a room with 15 children by myself (due to under the roofline ratios). All the time I've given rolling out this information has been after hours or in my lunch break"* (ECT).

Other barriers reported included a lack of support from management (13%), *"We have not been given time to share and discuss what we have learnt throughout the PD with other staff. We are challenged by under the roofline staffing"* (ECT);

difficulties finding time to distribute the information (12%); specific characteristics of the team or educators which were impeding change (12%); lack of presence in the centre due to part-time employment (8%); and insufficient staff or challenging ratios (10%)

> *"Time, especially in helping other educators understand the study. For example, in my environment we have three areas open and only three educators for 33 children which means we do not often get the chance to work alongside each other or engage in small group work"* (ECT).

With respect to suggested improvements, about a third (35%) responded that no further improvements were needed. The most common suggestions related to the format of the PD (14%), such as varying the days between sessions and allowing more time between sessions to implement changes. Educators also preferred to have more hands-on activities (10%) to help with their learning. Other comments related to the delivery of the PD, such as difficulty hearing the speaker (5%), difficulties getting onto the Moodle (5%), and wanting to have more staff from their centres attending (5%).

In summary, the majority of educators who completed questionnaires were very positive about the PD. They noticed changes in themselves, their colleagues, children and families.

6. Discussion

The mixed-method REEL study involved delivery and evaluation of an evidence-based PD programme for ECEC staff. Effects were investigated in terms of the impact of participation in the PD on educators practices within the ECEC context, and resultant quality of curricula and interactions in their settings. This has revealed findings of great interest to academics, policy-makers, ECEC trainers, practitioners and parents.

In adopting the strongest possible design for drawing conclusions about the effect of the Leadership for Learning PD – a cluster randomised control trial (RCT) – the REEL study showed clear and strong positive effects of PD participation on quality. Namely:

1. The results of the intention-to- treat analyses, which included every centre in the study to estimate effects under conditions of variable PD attendance and implementation (as may be expected in a large-scale, real-world roll-out), revealed that the PD had a significant effect upon curricular and interactional quality. This was apparent in the positive change from pre-test to post-test for both quality measures (ECERS-E and SSTEW), capturing important aspects of process quality (i.e., interactional, curricular) that have been shown to contribute to child outcomes.
2. In considering the subscales of these two measures, the benefit of the PD was distinctly apparent for: (i) Literacy; (ii) Science; (iii) Diversity; (iv) Building Trust, Confidence and Independence; and (v) Supporting Learning and Critical Thinking. This shows the breadth of areas for which the Leadership for Learning PD had a positive impact on the evaluation measures. Further benefits to non-measured areas are also possible, and are indeed suggested by the qualitative results.
3. The benefits of the PD are even more apparent when those centres that did not have a reasonable level of participation in the PD are omitted. In these per protocol analyses, which estimate the effects when the program is implemented with reasonable fidelity, the effects are even stronger across all subscales and show an additional area that the PD positively impacted (i.e., Assessing Learning and Language).

Confidence in these effects is maximised by the scientifically rigorous nature of the research design. RCTs are a powerful research tool that were originally developed for use in clinical and scientific settings, which are typically highly controlled, and so limit the influence of extraneous factors. RCTs gain their power because randomisation balances the effects of other plausible explanations for the results across the intervention (PD) and control groups (practice as usual), hence making detection of treatment effects easier and attribution of causality more *confident*. In considering the behaviour of ECEC staff and hence the quality of provision, there are a large range of factors that might be influential, such as variation in families and children, previous experiences of staff, daily fluctuations in mood or personal life, neighbourhoods, etc. In real-life settings there is minimal, if any, control of extraneous factors. Nonetheless randomisation can balance out the effects of such factors, if the sample size is large enough.

In the application of RCTs to real-life settings, due to financial and pragmatic considerations, it is extremely difficult to have a sufficiently large sample to be confident that randomisation is completely balancing out the effects of extraneous factors. In order to allow for the fact that the limited number of centres in the REEL study may not completely balance out (and

thus rule out) extraneous factors, the analyses controlled for a wide range of additional centre factors including geography (i.e., regional or metropolitan), NQS rating (i.e., working towards, meeting, exceeding), area-level SES (i.e., SEIFA decile), and pre-intervention quality (as rated on the ECERS-E and SSTEW scales). The fact that the effects of the PD still remain even after allowing for the potentially powerful effects of these extraneous factors is testament to the strength of the PD effects detected in the REEL study.

Given overwhelming evidence that better ECEC quality is linked to better child outcomes, it is probable that the PD effects would lead to better child outcomes, particularly in the longer-term, as the children have more time to experience the improved ECEC quality. Even within the very short time scale of the REEL study there are indications in the qualitive analyses that practitioners are detecting such effects upon children. Also the previous FEEL study (Siraj et al., 2018) provided evidence of such child outcome effects of PD.

Indeed, the qualitative study of practitioners perceptions elucidates, partly, how the PD programme supported practice change and also identifies some key barriers to enhanced pedagogy and implementation. Overwhelmingly, educators reported experiencing a positive shift in their personal pedagogy, with nearly two-thirds noting increased confidence and motivation to implement changes and improve learning experiences for the children in their care. Many described an increased awareness of what quality practice looks like and of the evidence base underpinning effective practice. Analyses revealed an increased awareness of the "many opportunities" to engage in effective pedagogy, coupled with a deeper understanding of the role of quality interactions as the foundation for children's learning.

The renewed sense (i) of purpose experienced by a number of the educators, and (ii) of understanding about the role high-quality ECEC plays in fostering better developmental outcomes among children were important outcomes of the PD.

Improvements in the quality of centres was matched by tangible changes in practice. Several educators mentioned increased focus on planning and documentation, and on greater attention to key curriculum areas including science, numeracy and literacy - along with more integrated curriculum experiences. Self-regulation was identified by almost one-quarter of participants as being foundational for children's development, and an increased focus on supporting children's self-regulatory abilities and approaches to conflict resolution was an important outcome of their involvement in the PD.

Aspects that supported the PD were the use of structural supports such as the environmental rating scales and the planning tools; links with the Goodstart Practice Guide; the increase in evidence-based practices where the PD provided clear links between practices and child outcomes; hands-on activities and practice examples; the fidelity and effectiveness linked to the capability, credibility and knowledge of the presenters; professionalisation of participants, opportunities for networking, and the structure that allowed for reflective practice during the PD (e.g., duration, time between half-day sessions).

An important feature of the PD was the cascading model of delivery, where participants adopted a leadership role with responsibility for leading not only personal change, but also change within their teams. Centres with the highest levels of growth in environmental quality over the course of the intervention embraced the leadership for learning model of influence – (i.e., they were intentional and purposeful in the strategies in ensuring their peers' engagement in the PD journey). While educators identified changes in their own

understanding and pedagogical approaches more readily, there were some shifts among their non-participating colleagues, including improved communication and interactions; these, however, were not representative of the cohort as a whole, with most educators reporting little or no change among staff.

A number of the participants identified the importance of sharing knowlege and practices outside the training milieu, but fostering change among non-participating colleagues was perceived by a high proportion of educators as challenging and may, in part, account for lower levels of improvement experienced in this study as compared to the FEEL study and case studies (see Neilsen-Hewett et al., 2018; Siraj et al., 2018). The most frequently cited challenge among educators in the REEL study was the difficulty perceived in taking the information from the PD and sharing this with their non-participating colleagues, with only one in five participants saying their colleagues were responsive to the changes they tried to implement. In the FEEL study, the transferrance of knowledge and active support for practice change among staff was prioritised by the participants resulting in significant improvements in educator quality at the room level. Processes and ideas for sharing information with colleagues were integrated throughout the PD and were an important feature of the *Leadership for Learning* model; many of the participants, however, felt there were too many contextual barriers to allow for this to occur.

"Staffing" was both a facilitator and barrier to practice change. The two factors cited most as supporting implementations of learning from the PD were (i) another staff member from their centre attending the PD, and (ii) colleagues who were supportive and receptive to change. While about a third of participating centres were perceived to be 'receptive', more than half the respondents cited their colleagues' reluctance to embrace change as a significant barrier. Potential reasons for this include educator burnout, educators being overwhelmed by the number of changes that had occurred within the organisation, too many demands, a lack of value, low levels of staff qualifications, staff turnover and casualisation of staff.

Not surprisingly, "time" was identified as another key barrier to practice change, which for many was linked with support, or lack of support, from centre managers. Challenging ratios that did not allow for structural shifts in practice, such as the implementation of small group work to promote engagement in sustained shared thinking and problem-solving, frustrated many educators who had set improvement as a goal.

Findings from the qualitative component of the study underscore the instrumental role of centre-based leadership in supporting practice change and fostering high quality pedagogy and practice. For a number of years now, researchers have widely acknowledged "effective leadership" as integral to the organisational climate of the ECEC context (Brownlee, Nailon, & Tickle, 2010; Ebbeck & Waniganayake, 2003; Nicholson et al., 2018; Rodd, 2006; Siraj-Blatchford & Manni, 2006). The current findings build on this research, highlighting the active role that leadership plays in supporting practice change and, more importantly, in the creation of environments that foster quality pedagogy. Several educators attested to the lack of support from centre management and to the lack of attention awarded to the PD; this resulted in the educators not being given time at staff meetings to discuss new practices and ideas, and no time off the floor for planning and reflection – a necessary condition for practice change.

One focus of the PD was to ensure that improvements would extend beyond ECEC to the early home learning environment, given the evidence on its importance for child development

(Melhuish et al., 2008b). Around one-half of the educators commented on the PD enhancing communications and connections with families – with many families commenting on changes that they had seen at their centre during the PD. Educators noticed that families showed greater understanding of their children's learning, and increased awareness of the educator's role in their child's life.

Encouragingly, almost all the educators described changes among the children in their care as a result of the PD. Changes were framed in two ways: (i) the educators' own modified practices with the children (what children experienced); and (ii) how the children responded to new experiences. The impact of the PD on children, as perceived by educators, was seen largely in terms of increased engagement and motivation, and enhanced learning and problem solving. Children were seen to be more active-problem solvers, to enjoy learning opportunities, to be more regulated in their behaviour and more capable of expressing themselves. Perceived changes among children further motivated educators to continue on their improvement journey.

Building on the existing body of research, the findings of the REEL study highlight the potential for high quality PD to produce substantial and practically meaningful improvements in staff practices and room level quality. Quality practice depends on PD to be made routinely available for all ECEC practitioners. Up-skilling the workforce is now a priority in many countries given the variance in training and the unequal quality of initial under-graduate and other qualifications (Siraj & Kingston, 2015). Australia has a strong framework for ECEC in place, but successful implementation of frameworks requires investment for staff support, including in-service training and pedagogical guidance, as well as favourable structural conditions.

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8. Glossary of Terms

ABS	……	Australian Bureau of Statistics
CCC	……	Child Care Choices Longitudinal Extension (study)
CERT-3	……	Certificate III
CLIQRS	……	Curriculum, Leadership and Interaction Quality Rating Scales
CSBQ	……	Children's Self-Regulation and Behaviour Questionnaire
E4Kids	……	Effective Early Educational Experiences (study)
ECEC	……	Early Childhood Education and Care
ECERS-E	……	Early Childhood Environmental Rating Scale - Extension
ECT	……	Early Childhood Teacher
EPPSE	……	Effective Pre-school, Primary and Secondary Education project
ERS	……	Environmental Rating Scales
EYLF	……	Early Years Learning Framework
FCCC		Families, Children and Child Care (study)
FEEL	……	Fostering Effective Early Learning (study)
HLE	……	Home Learning Environment (early)
LFLPD	……	The Leadership for Learning Professional Development Programme
LSAC	……	Longitudinal Study of Australian Children
NICHD	……	National Institute of Child Health and Human Development
NQS	……	National Quality Standard (Australia)
NSW	……	New South Wales (Australia)
OECD	……	Organisation of Economic Cooperation and Development
PD	……	Professional Development
RAPIE	……	Reflect and Assess, Plan, Implement and Evaluate Improvement Cycle
RCT	……	Randomised Controlled Trial
REEL	……	Researching Environments for Early Learning Study
SDQ	……	Strengths and Difficulties Questionnaire
SEIFA	……	Socio-Economic Indexes for Area (Australia)
SES	……	Socio-Economic Status
SST	……	Sustained Shared Thinking
SSTEW	……	Sustained Shared Thinking and Emotional Wellbeing (scale)
UOW	……	University of Wollongong
UK	……	United Kingdom
US	……	United States

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Appendix A
Leadership for Learning Expected Outcomes

LEADERSHIP FOR LEARNING: EXPECTED OUTCOMES Increased awareness of evidence based learning and knowledge of recent understandings of effective practice with young children including the importance of relational and intentional pedagogy. Our relational pedagogy is founded in a strong child-centred approach; we are respectful and responsive to children, using their interests, knowledge and understanding to inform our intentional pedagogy.		
OWN LEARNING	**PEER LEARNING**	**CHILDREN'S LEARNING**
• Increased knowledge and understandings of child development and content knowledge in the areas of personal, social, emotional and self-regulation development and emergent language, literacy, numeracy, science and exploration. • Better understanding of child-centred approaches to practice and the clear links between relational pedagogy and intentional teaching practices. • Enhanced understanding of and respectful support for individual children and their specific needs so that all children's outcomes are enhanced, with particular attention given to supporting children deemed 'at risk'. • Awareness of new approaches to the education and care of young children, each other and the people with whom you work . • Increasing focus and responsiveness to the learning and understanding of all children, parents/carers, yourself and staff in your setting through reflective practice and ongoing quality improvement processes. • Applying assessment and linking this with planning and intentional pedagogy both for individual children and groups. • Greater confidence and understanding of the Home Learning Environment (HLE) and in working in partnership with parents/carers. • Developing and practicing your role as Leaders for Learning Champions (LLC) supporting and leading change and quality improvement within your own settings as well as becoming active members of a larger community of learners.	This is a challenge facing you as Leaders for Learning Champions (LLC). How will you take your new knowledge and understanding into your ECEC setting? How will you support the other members of staff that work in your centre/preschool? How will you effectively balance theory and practice? • Collaborating and sharing of information. • Using change plans to impact practice. • Informal discussions and reflections. • Delivering staff development sessions. • Sharing of online support and information. • Differentiating content and learning materials to suit the different staff working in your centre/preschool. • And anything else?	The ultimate goal is to improve outcomes for children • Extending communication and language, vocabulary and phonetic awareness • Enhanced creativity – takes risks, is imaginative and curious. • Uses metacognitive strategies – predicts, monitors, checks, reflects, evaluates • Enhanced problem solving, emergent numeracy and literacy skills and scientific thinking. • Improved self-regulation – perseverance, attention, engagement, ability to plan • Enhanced emotional adjustment - understanding of emotions, increased initiation and responsiveness. • Enhanced social skills and cultural competence – improved peer and adult connections • Ownership over their own learning - active, autonomous and engaged thinkers.

Appendix B

Table B.1. *Standardized Beta Weights for Predictors of Post-Intervention ECERS-E and SSTEW Ratings, Intention-to-Treat and Per-Protocol*

	ECERS-E					SSTEW					
	Overall	Literacy	Math	Science	Diversity	Overall	T,C,I	Soc-Emo	Lang	Lear-Crit	Assess.
Intention-to-Treat											
Group	.30**	.31**	.18	.34**	.24*	.24*	.24*	.19	.19	.29*	.18
Geog. cat.	-.02	-.10	-.08	.15	-.08	-.14	-.14	-.05	-.04	-.14	-.22
NQS rating	.22	.20	.23	.13	.14	.18	.21	.17	.19	.11	.15
SEIFA dec.	.18	.18	.19	.07	.14	.21	.22	.22	.14	.15	.18
CIQRS T1	.02	.31*	-.10	.00	.11	.30*	.35*	.18	.29*	.22	.22
PD Attend.	.29	.47**	.18	-.02	.30	.42**	.52**	.38*	.43**	.32*	.35*
Per-Protocol											
Group	.33**	.37**	.20	.34**	.28*	.30**	.31**	.24	.23	.34**	.25*
Geog. cat.	-.03	-.13	-.10	.18	-.07	-.18	-.21	-.09	-.09	-.16	-.21
NQS rating	.23	.22	.22	.14	.16	.19	.20*	.18	.18	.13	.17
SEIFA dec.	.18	.17	.19	.09	.12	.19	.20	.22	.13	.13	.15
CIQRS T1	.01	.26*	-.09	.04	.10	.24*	.31**	.13	.24	.18	.15
PD Attend.	.23	.20	.18	.22	.22	.18	.30	.10	.26	.06	.02

Note. Initial regressions considered associations of group with subsequent quality, controlling for the complement of covariates. A subsequent regression removed the group variable and, instead, entered a PD attendance variable to investigate the association between level of PD attendance and subsequent quality, after controlling for this same complement of covariates. *p<.05; **p<.01

Appendix B: Examples of questions included in the Educator Evaluation of the Professional Development

Table C.1. *Description of Questions Included in Educators' Evaluation of Phase 3*

Question	Description
1.	What has changed for you as an educator as a result of the 'Leadership for Learning' professional development? Please rate each statement (e.g., I feel more motivated/the PD has renewed my enthusiasm for teaching).
2.	Please mark your top two changes listed above with an asterisk (*)
3.	Please describe the biggest changes/improvements to quality for you as an educator
4.	Please describe the biggest changes/improvements to quality for your colleagues
5.	Please describe the biggest changes/improvements to quality for the children
6.	Please describe the biggest changes/improvements to quality for the families
7.	Briefly describe (giving up to three examples) what you think has been the greatest impact on your practice for the longer term.
8.	Now we would like you to think about how each element of the professional development has supported you. Please give a rating below to each element to reflect how important they were in supporting your knowledge base in early childhood education and care or improvements to practice (e.g., Phase 1 – Learning about quality practice and research evidence).
9.	Please provide a little more detail here about the elements you rated most highly in Question 8. What was it that most supported you? If you find it more helpful to write about the ways in which the elements worked in combination then please feel free to do this.
10.	Provide a little more detail about the elements you rated least highly in Question 8.
11.	Now we would like you to think a bit more about the online learning environment. Please describe how you engaged with the online content (i.e., used this to support and share information with colleagues in your centre; revisited content; contributed to discussions)
12.	What (if any) were the barriers to using or accessing the online learning environment? How could this be improved?
13.	If you did not use the online environment, what else would have helped you?
14.	How competent are you in using computers/digital tools?
15.	Now think about how you have exercised your role as a Leader for Learning Champion. What ways have you cascaded your learning from the PD to other colleagues in your centre/preschool? What impact has there been for colleagues as a result of your involvement? This might include personal impacts (e.g. openness to change), practice impacts, or differences in the ways you collaborate as a team.
16.	What have been the main challenges during the PD in enacting changes? These might be personal (e.g. confidence) or relate to your centre/preschool (e.g. engaging colleagues), to wider factors.
17.	Which factors have most supported you in enacting changes as a result of this PD?
18.	This questionnaire has encouraged you to think carefully about your learning and professional growth, the changes to practice you have made and how the project has supported you identified in Questions 3 to 6. This final question asks you to tie all of these things together. Please choose one of the changes to practice that you identified in Questions 3 to 6 and briefly describe how this change came about. What was the catalyst for you working on this area? How did the project support you? Who did you work with to make the change and how did you go about it?

Appendix C: Environmental Rating Scales: Subscales and Items

When measuring structural and process quality variables in ECEC, researchers commonly use observation-based rating scales. These allow direct comparisons of environmental quality to be made across studies, and promote greater objectivity of observations. The most widely used observation scales are linked to a family of early childhood Environment Rating Scales (ERS).

Many studies choose ERS as measures because of their international reputation for measuring important aspects of ECEC quality that relate to children's outcomes, and the fact that they provide a numerical index of quality ranging from 1 (inadequate) to 7 (excellent practice), making comparisons between and within centres helpful as pre- and post-assessments of environmental quality (see also two example ERS items on the following pages).

For the FEEL study, quality of provision in centres was measured using the Early Childhood Environment Rating Scale - Extended (ECERS-E) and Sustained Shared Thinking and Emotional Well-Being (SSTEW) scale, which use concepts central to child development, early childhood education, diversity, care and pedagogy. These scales are briefly summarised in Table C.1 below.

Table A.1. *Summary of Environmental Rating Scales*

Environment Rating Scale (ERS)	**Brief description of quality aspects covered**	**Provision for which it is designed**
Early Childhood Environment Rating Scale-Extended (ECERS-E) Sylva, Siraj-Blatchford & Taggart, 2010	Considers the curriculum and educational pedagogy. In the following 4 areas: 1. Language and literacy; 2. Maths and number; 3. Science and the environment; 4. Diversity (meeting and planning for the needs of individuals and groups).	ECEC environments for children aged 3 to 5
Sustained Shared Thinking and Emotional Wellbeing (SSTEW) Scale Siraj, Kingston & Melhuish, 2015	Considers 5 aspects of process quality including: 1. Building trust, confidence and independence; 2. Social and emotional well-being 3. Supporting and extending language and communication; 4. Supporting learning and critical thinking 5. Assessing learning and language	ECEC environments for children aged 2 to 5

Example ECERS-E Item (Sylva, Siraj-Blatchford & Taggart, 2010, p. 38)

Item	Inadequate		Minimal		Good		Excellent
	1	2	3	4	5	6	7
Item 10. Natural Materials							
	1.1 There is little access indoors to natural materials (fewer than 3 examples).		3.1 Some natural materials are accessible to the children indoors.* 3.2 Natural materials are accessible outdoors.*		5.1 Natural materials are used beyond decoration to illustrate specific concepts, (e.g. planting seeds or bulbs to illustrate growth, seed dispersal). P D * 5.2 Children are often encouraged to explore the characteristics of natural materials. * 5.3 Adults show appreciation, curiosity and/or respect for nature when with children (e.g. interest in, rather than fear or disgust, for fungi or worms). *		7.1 Children are encouraged to identify and explore a range of natural phenomena in their environment outside the centre and talk about/describe them. (P D) * 7.2 Children are encouraged to bring natural materials into the centre. D Q* 7.3 Children are encouraged to make close observations of natural objects and/or draw them. P D R *

Example SSTEW Item (Siraj, Kingston & Melhuish, 2015, p. 14)

Item	Inadequate		Minimal		Good		Excellent
	1	2	3	4	5	6	7
Item 1. Self-regulation and social development.							
	1.1 Staff do not appear to agree about the boundaries/rules/expectations or apply them consistently*. 1.2 Some children are left even though they are obviously confused or distressed.		3.1 Expectations and boundaries are made explicit and shared by all staff*. 3.2 Staff are respectful and professional around the children, parents/carers and each other*.		5.1 Staff explain carefully to the children what they need to do and pre-empt any difficulties*. 5.2 Staff show empathy and understanding when children do not want to follow rules or get upset*. 5.3 Staff show an awareness of individuals and their needs, giving additional support and allowing some flexibility*. 5.4 Staff redirect inappropriate behaviour by stating what the children should do rather than what they should not. .		7.1 Staff congratulate children when they follow the rules well. E.g. I saw you help put the tractor away. And/or the children are encouraged to tell staff how they followed the rules etc*. 7.2 Staff have agreed processes that they follow when conflicts arise. The process includes engaging the children in problem solving and finding solutions to disputes together*.

Appendix D: Examples of Educator Responses

Table D.1. *Top Themes Identified By Practitioners with respect to Perceived Changes to Individual Practice*

Theme	# Educators	Example
Confidence and motivation	37	*The PD made me more confident and spontaneous in extending the learning interest of the children with compromising my intentional teaching. I gained more ideas and creativity in providing learning experience to the children that integrate new learning areas.*
Improved knowledge and understanding	25	*It has enhanced my learning as I have begun to actually notice how much science and maths is involved in most of the experiences for the children which has further motivated me to use the correct terms and enhance the children's knowledge. I have been making a deliberate decision to actually add it to my planning (planned or spontaneous). It has motivated me as a group leader to enact, to motivate other co-educators to embrace the change.*
Improved pedagogy	20	*It has given me confidence. I've always been a holistic thinker and this PD has given me a framework that allows me to deliver an integrated Programme. I've also grown a lot through reflection against the information delivered in this PD. For example, using "OWLing", I've caught myself in moments of interacting with children where I know I could have done that better. The PD has also given me a tool to strive for excellence. I'm pushing myself towards specific goals as presented in the scales.*
Science	16	*Doing a science experiment - volume and measurement. Then doing a food preparation experience and incorporating numeracy, literacy and science into this experience. We are also in the process of starting a library involving educators and families. Now I am aware of integrating science, literacy, numeracy, self-regulation into experiences and I find that its great.*
Planning	15	*I have recently been reflecting on how my planning can reflect what the PD has offered me. I am currently in the process of exploring different ways of making the learning visible and meaningful for educators, children and families.*
Environments as key	15	*I have made learning more evident in my room and have requested more resources for the room that we needed to extend children's interest. I have realised how the environment: and simpler, photos, charts pertaining to the learning of the children, serves as a learning tool that promotes children's learning.*
Language/ vocabulary	15	*Monitored my use of specific language and terminology when working on extending children's learning*

Theme	# Educators	Example
Numeracy	14	*The concepts of mathematics have been introduced to the educators who work for 3+ years group and they are now setting up some relative experiences.*
Literacy	12	*Literacy: including books to support learning different areas in the room. Children pick their books each Monday to include in our home corner. Literacy (writing) area is created for the children.. I have implemented more questioning in the dialogic reading time so that the children have more time for language development and building confidence at the same time.*
Increased experiences and opportunities	12	*Attending these professional development days have caused me to be more aware of my practices and rethink the experiences that are being set up in the room. For example, block game with wooden blocks - engaging with the children in sustained shared conversations about height, length, making predictions, problem solving, balance, etc.*
Distribution of information and sharing	10	*It has given me a greater knowledge and better understanding on different topics and also inspired me with a new motivation to share with my fellow educators.*

Table D.2. *Top 10 Themes Identified By Practitioners with respect to Perceived Changes to Other Educators in their Centre*

Theme	# Educators	Example
Staff supportive and open to change	12	*We have implemented these strategies in our own room and staff have been great. We haven't gone around to other room yet or mentioned it in a staff meeting.*
Pedagogy	11	*Some staff are asking questions and clarifications on the resources given. The have become more aware of the learning present in the experiences/areas that they set up (e.g., "are the autumn leaves part of science?")*
Relationships and interactions with children	10	*The staff are using more open-ended questions and interacting more with the children.*
Implementation - Barriers	9	*At the moment, minimal as staff are aware of the Programme but not in detail. Staff in my room have been changed a few times because of staffing/ratios. Therefore, working on it with current team member.*
Distribution of information and sharing	8	*Staff are listening and implementing on ideas their own and sharing and documenting on our discussion on the REEL.*
Improved knowledge and understanding	8	*After sharing the REEL study, staff improved their knowledge and interactions with children*
Supporting small changes first, step by step	7	*Implemented through group/room meetings. Introduced as a whole at staff meeting briefly but first working on with room staff. Reviewing areas of the scale and marking where we think we are at, now we can improve and implement this and reviewing/analysing what we can do better.*
Reflective Practice	7	*A lot more self-reflection. A lot more getting staff to self-reflect and using it as part of performance assessment. Professional conversations with educators about concepts in experiences they have set up for them to acknowledge the concepts in what they are doing.*

Table D.3. *Top Themes Identified By Practitioners with respect to Changes seen among Children in the Centre*

Theme	# Educators	Example
Children as eager, motivated, engaged	32	*Children are more receptive and are more engaged in their environment .*
Changes to own practice	22	*Better communication styles, with more opportunities for educators to speak to them. I have loved slowing down my own communication and letting the children lead more of their own thinking*
Relationships and interactions with children	15	*More quality interactions - I have better relationships - deeper understandings and connections I think children participate more in relationships to their peers*
More learning and problem-solving	14	*Extended learning, children have had opportunities to be emerged in science - numeracy- literature all in the same activity - this has allowed them to all take something from experiences and question and extend on their own knowledge.*
Children are better behaved	10	*The children are beginning to self-regulate with more confidence. They are building strategies for negotiation and the impact this has had on our space is evident. The educators have more time to dedicate to other areas of the Programme as the children build this area of independence. This is across the centre.*
Numeracy	9	*The children have been more engaged at the art table talking about numeracy. The art has changed and is more manned (in a good way).*
Science	9	*Children are more engaged in the experiences we've offered to them. They ask more questions that reveals mathematical and science concepts.*
Pedagogy	9	*Look at the learning from a child's perspective - is it fun, engaging, meaningful to them.*
Children able to express themselves	7	*The children are able to express their interests and input the learning Programme. The children are able to expose to more higher quality learning activities as well as engage in better conversations with their teachers.*
Language and vocabulary	7	*The children have been more engaged and use a larger vocabulary.*

Table D.4. *Top Themes Identified By Practitioners with respect to Changes seen among Families*

Theme	# Educators	Example
Involvement and connection with family	28	*Families are enjoying seeing the experiences (individual and group) that we are doing and are communicating more which is improving my relationships with the families.*
Positive feedback from families	19	*Families have welcomed the changes and are keen to give feedback and provide more information about their children.*
Families noticing changes	12	*Families have been giving us great feedback. Saying the children have been replicating what they're doing at kinder at home. With one mum saying her daughter who never spoke, now never stops talking.*
Little or no change observed	11	*I don't feel this has happened as yet but the plan will be to get staff involved with discussing with families how their children engaged and what they learnt, share the same terminology with them as we do when planning. This will impact their understanding of how much learning we promote and encouragement we provide their children and benefits.*
Greater understanding by families	7	*They are more educated about the variety of maths and science experiences children can learn through. They are learning the importance of understanding concepts, rather than concentrating on writing numbers and letters. They are working in collaboration with the teachers and educators to teach children concepts through games etc*

Table D.5. *Top Themes Identified By Practitioners with respect to Perceived Supports/Facilitators to achieving Practice Change*

Theme	# Educators	Example
Distribution of information and sharing	34	*I have been going into the rooms on my educational leader time assisting educators to incorporate and given ideas how to incorporate maths, science and literacy more effectively into their Programmes (as a starting point).*
Other staff attending PD	24	*Having two educators attend the PD has helped especially with ideas and sharing information. At our team meeting working within room groups educators were more confident and comfortable which increased the drive for receptiveness.*
Practical examples and activities	22	*Really enjoyed the hands on activities in all of the professional development days. It really helped me learn and take things in as I am a hands on learner. I enjoyed the way each session was presented and loved all the presenters.*
Staff supportive and open to change	21	*The staff were open to listening and learning what we have been gaining from these PDs which made implementing it much easier. Having access to information to remember/reinforce what was discussed during these PDs.*
The presenters	19	*The PD team spoke clearly and interacted with us by using our names which made the experience personal. Their friendly dispositions and humour kept us interested and it made the presentation enjoyable and easy to follow.*
Other services and networking	15	*Having a network of centres receiving the same seminars, so that we can discuss similar challenges. Having face-to-face interactions with academics so that we can have answers immediately and get sound advice*
Management and Structure	10	*Our director has been super supportive and encouraging - she has loved all the new things I have been doing. My staff have also been great. Really open to try new things and new ideas. They really love the OWLing technique.*
Time	10	*Being given time at staff meetings to present material.*
ECERS-E and SSTEW	12	*I really like the rating scales. They give guidance for myself and other staff members in the room to reflect on our practices.*

Theme	# Educators	Example
Pedagogy	11	*Gives me a framework to support my teaching practice in specific areas that the EYLF doesn't provide. For example I can boost my effectiveness in literacy by looking at scale of 'emergent writing/mark-making'. I now have a writing area as well as clipboards, printed material and writing materials throughout the space and can be specific about my intentions with those resources. This PD has given my practice credibility and confidence to strive for best practice and high quality in the environment. It's all the nuts and bolts the EYLF is missing.*
Integration across domains	9	*The professional development affirmed my practice that I can embed literacy, science and numeracy learning springing from a piece of story. For example, reading "The big block of chocolate" storybook lead us to an ongoing inquiry of the life cycle of an ant, it's implications to our attitudes (i.e., not sharing), staging a role play and having role names written on their role sash, preparing the set (stage), and doing a melting experiment (i.e., what melts under the sun, predicting outcomes and making a table of results).*
Research evidence	9	*I feel the effect of this study will increase quality. I believe providing the research with the why and the where the information, statistics and data has come from helps the educators take on board the information and want to implement the practices/concepts etc. If every educator attended these sessions the quality of education in the sector would increase.*
Informative - easy to understand	9	*It has given me a lot of amazing ideas to implement in my classroom. It has made me a more confident educator as I now feel like I do know what I am doing, it has allowed me to form really great, positive relationships with my fellow educators who are doing the training with me.*
Use of Online Moodle	6	*The online Moodle has been a great tool to revisit and share with staff.*
Conversations between educators	6	*Defining spaces on their learning environment. We are able to talk to our staff, to exchange ideas, to implement to their rooms.*

Table D.6. *Top Themes Identified By Practitioners with respect to Perceived Challenges/Barriers to achieving Practice Change*

Theme	# Educators	Example
Staff reluctance to change	33	*Educator attitudes in my centre "another thing to do", "I have studied enough", "don't need to learn anymore" “*
Distribution of information and sharing	32	Honestly speaking, this whole session was challenging, learning and being able to try and incorporate what we have learnt here within our centre/room. A change from what we are practicing and what we will be practicing. A change for the better.
Time	30	*Not enough time is a huge barrier. I only have little time to share what I learnt in the PD sessions to staff (a few minutes of conversations with each staff during children's nap time) and it is not enough time to have discussions on things because staffsare busy in their own rooms as well.*
Management and Structure	12	*No support from management. The most challenging has been the lack of support from the centre. For example, no time has been allocated throughout the days to implement change, or even at staff meetings to discuss the PD. I'm struggling to provide interactions that are based on shared sustained thinking when I'm in a room with 15 children by myself, (due to under the roofline ratios). All time I've given to rolling out this information in the kinder room has been after hours or in my lunch break.*
Staff ratios	8	*Under the roof line! – lots of times I am the only educator in my room so how am I meant to do small groups like that?!*
Distribution of information and sharing	7	*I haven't received any opportunity or not allocated any time yet to prepare a short presentation, so this is the biggest barrier. Apart from that I need time to use Moodle as planning time doesn't give me opportunity to go to Moodle, neither does my own spare time.*
Team/ educator characteristics	7	*Educators find everything a challenge even waking up to come to work.*
Staff presence in centre	5	*Barriers are the lack of consistency as I only work 3 days. We have not been given time to share and discuss what we have learnt throughout the PD with other staff.*